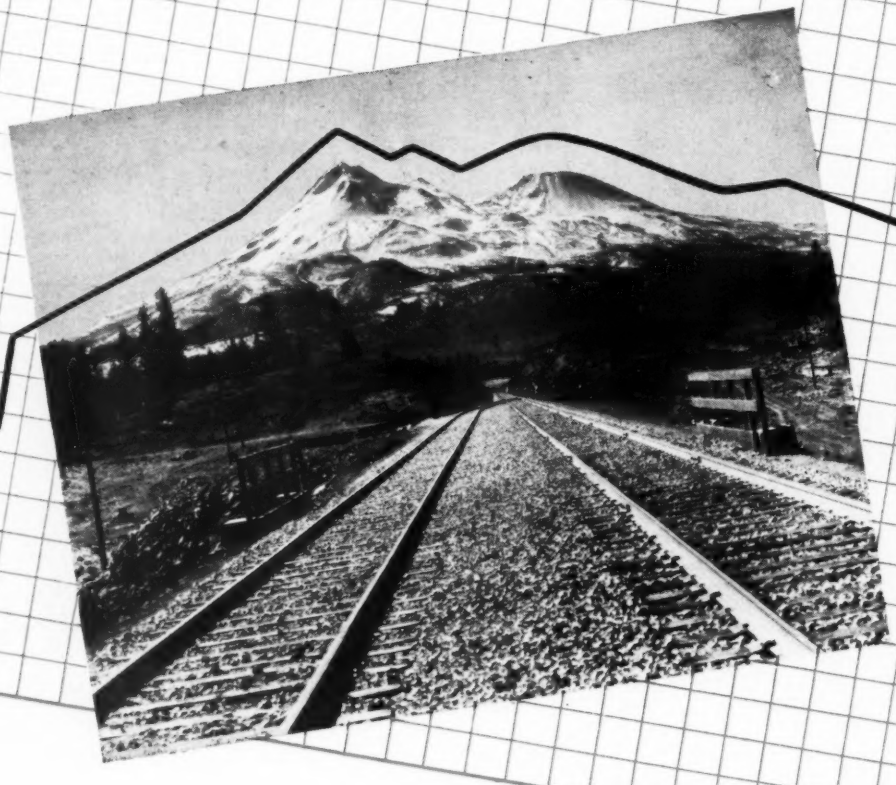
DECEMBER, 1948

Railway Engineering and Maintenance

FOR PEAK MAINTENANCE EFFICIENCY



Efficient maintenance improves when Reliance Hy-Pressure Hy-Crome Spring Washers are used on rail joint bolts. Keeping these bolts *tighter longer* reduces rail end batter, extends the time between track joint maintenance and saves money.

Reliance Hy-Pressure Hy-Crome Spring Washers are engineered to maintain adequate bolt tension which compensates for dimensional changes in the rail-joint assembly due to heavier axle loads and high speed rolling stock.

Let Reliance Hy-Pressure Hy-Crome Spring Washers help maintain your track-joint conditions at the peak of efficiency.

Edgemark of Quality

Reliance **HY-PRESSURE HY-CROME** *spring washers*

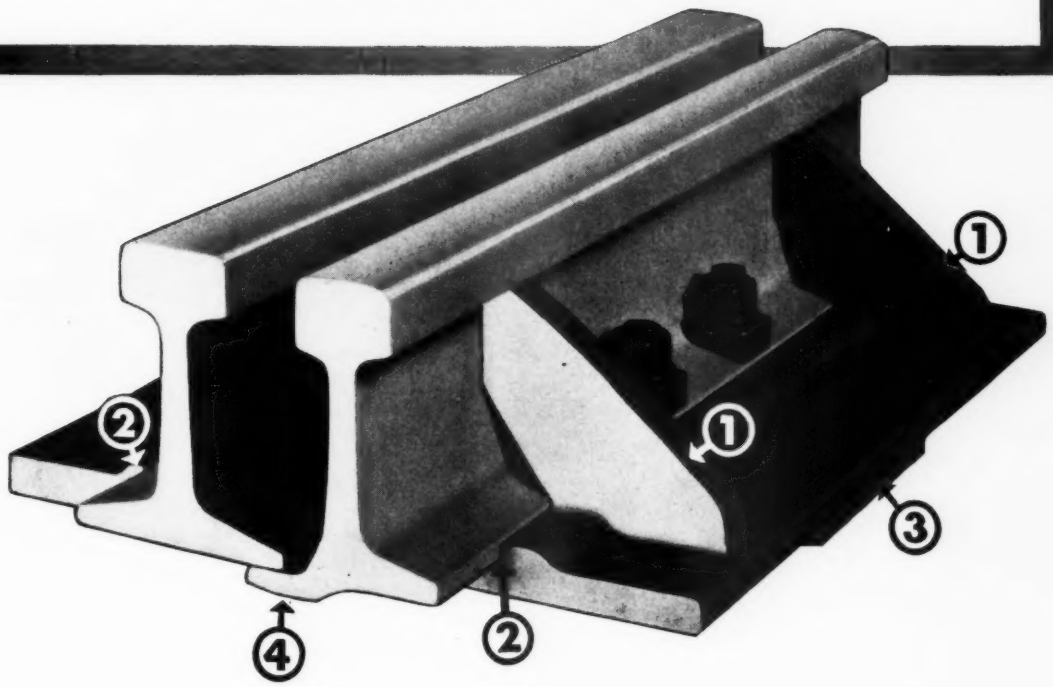
EATON

EATON MANUFACTURING COMPANY

RELIANCE DIVISION
Offices and plant: MASSILLON, OHIO

Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

Four Features that mean SAFETY



Here's a close-up view of what we believe to be the sturdiest, safest guard rail ever made. Essentially, it's our long-established Hook-Flange Guard Rail, but with new features that make it even stronger, even more shock-resisting.

Four points, especially, are worthy of close study:

1. *Heavy side braces.* These steel ribs bolster the guard rail against the most vicious thrust. They give maximum rigidity where it is needed—opposite the frog point.

2. *Deep, close-fitting shoulders.* Help maintain alignment of both guard rail and running rail.

3. *Welded reinforcing plate.* Adds strength, prevents spreading. Exerts a clamp effect.

4. *Hook flange.* This is the inner flange of the rolled-steel guard rail. It passes under a portion of the running rail; hence the weight of the train keeps the guard rail from overturning, no matter how sharp the side thrust.

All these features spell "safety"—*extra* protection. Ask a Bethlehem man for details of this fine development in guard rails.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

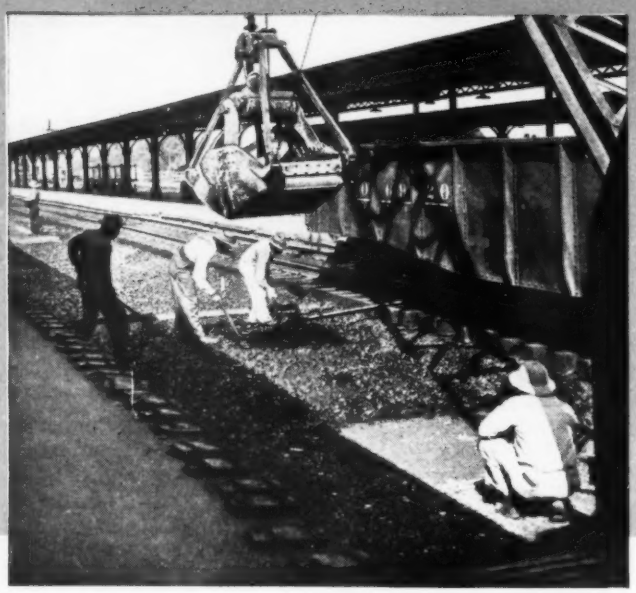
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

improved

BETHLEHEM HOOK-FLANGE GUARD RAIL

difficult drainage problem SOLVED!



Station track maintenance costs greatly reduced by coating ballast with Texaco Asphalt

THIS is a true story of certain station track that had to be completely rebuilt every summer — until, nine years ago, it was rebuilt with a coating of *Texaco Asphalt* on the stone ballast.

Since then, the only maintenance necessary has been minor repairs. The track has stayed in line and on grade. Water sheds quickly off the *Texaco Asphalt* coating . . . there has been no serious fouling of ballast . . . no heaving during the winters.

When you use *Texaco Asphalt* — proved through more than 40 years of service on America's streets, highways and railroads — you can be sure of ballast coating that stays flexible . . . that does not crack under traffic . . . and that can be tamped even after long service.

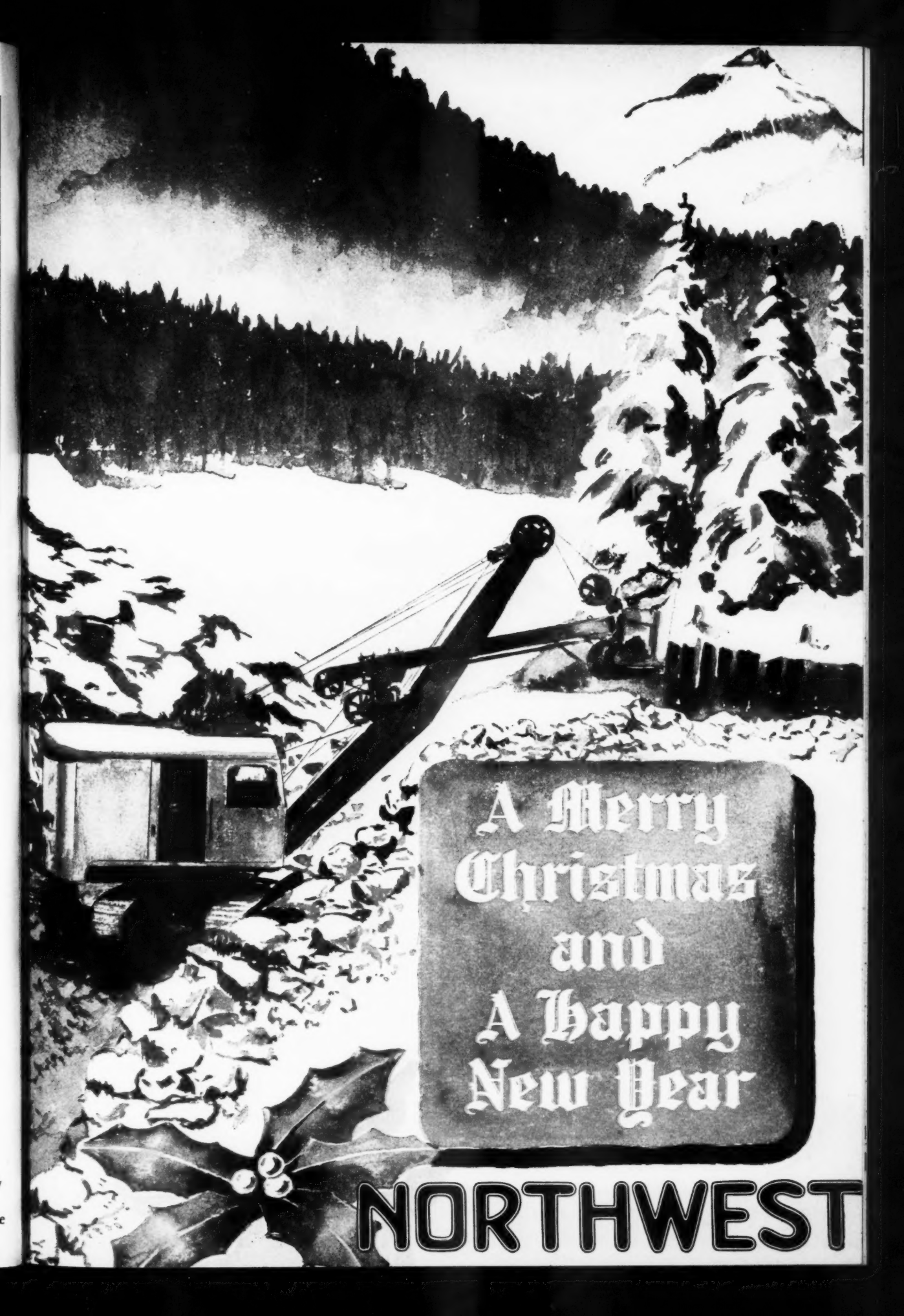
Get the full facts on the savings *you* can make with *Texaco Asphalt*. Call the nearest Railway Sales Division office listed below, or write The Texas Company, *Railway Sales Division*, 135 East 42nd Street, New York 17, N. Y.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. PAUL • ST. LOUIS • ATLANTA

TEXACO

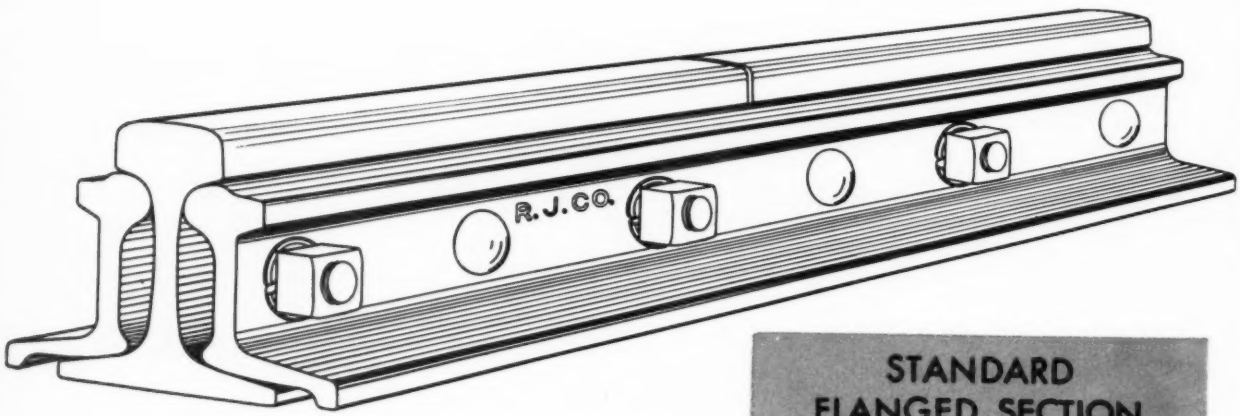
TEXACO Asphalt for Coating Ballast

Tune in . . . TEXACO STAR THEATRE presents MILTON BERLE every Wednesday night. METROPOLITAN OPERA broadcast every Saturday afternoon.

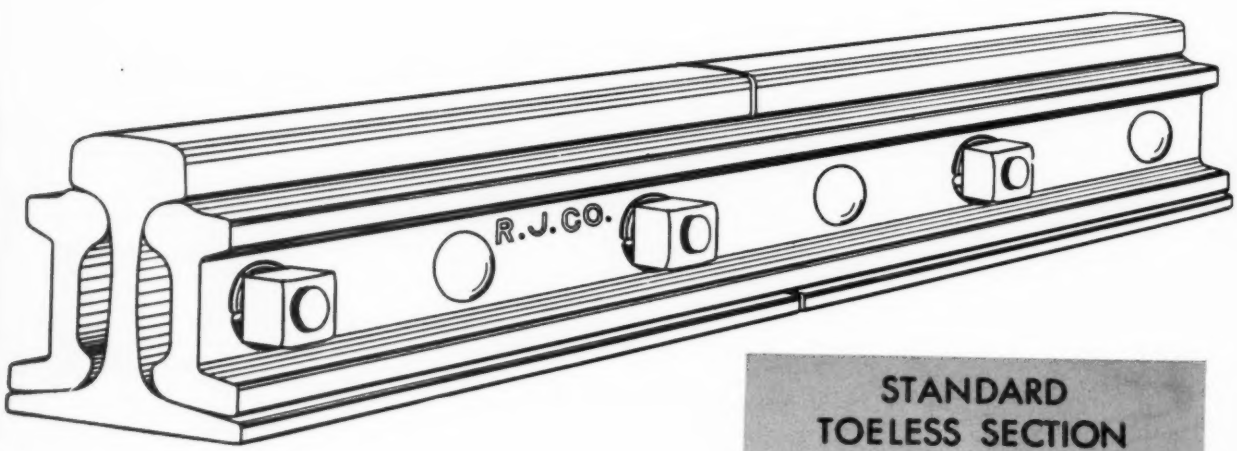

A Merry
Christmas
and
A Happy
New Year
NORTHWEST

BASIC DESIGNS FOR

Better joint bar performa



STANDARD
FLANGED SECTION

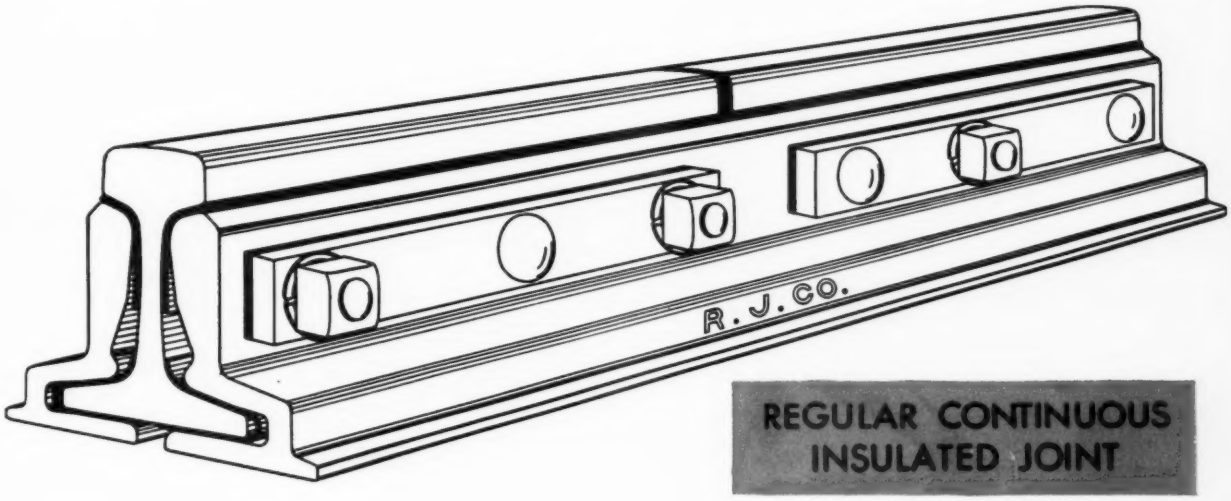


STANDARD
TOELESS SECTION

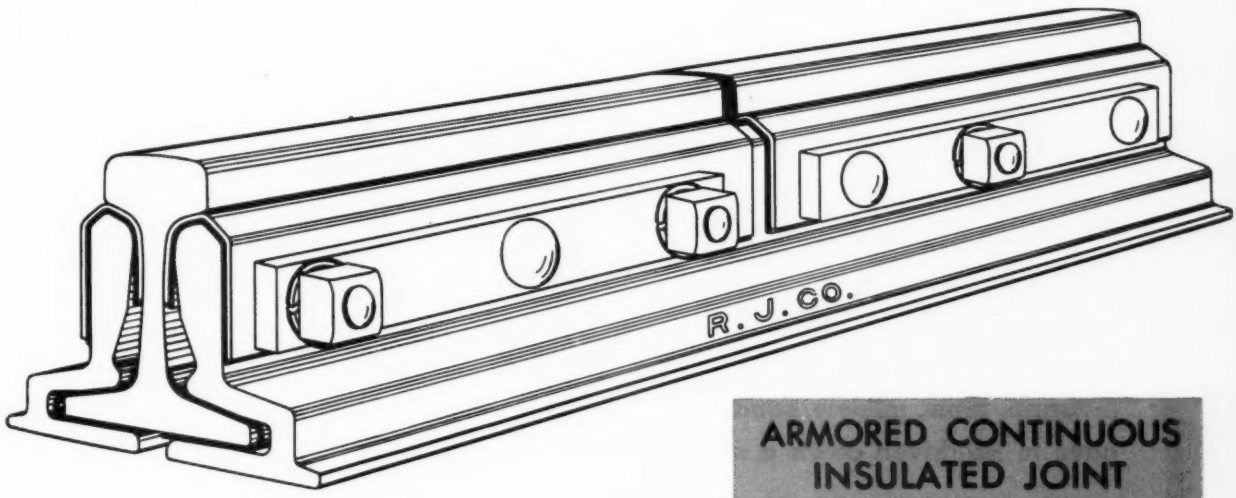
THE RAIL JOINT COMPANY INC.,

NEW RAIL SECTIONS

ance means longer rail life



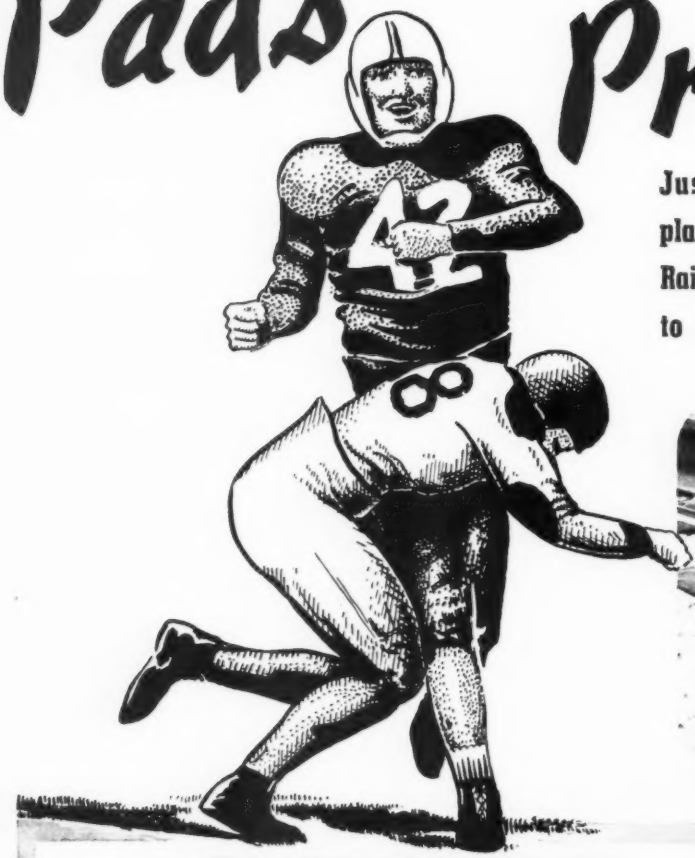
REGULAR CONTINUOUS
INSULATED JOINT



ARMORED CONTINUOUS
INSULATED JOINT

50 CHURCH ST., NEW YORK 7, N.Y.

Pads Protect!



Just as modern football protects its players with pads . . . so does modern Railroad Management use Fabco Tie Pads to protect ties against tie plate cutting.

FABCO TIE PADS

FABCO TIE PADS for Open Track reduce the mechanical wear of ties and are available at prices which definitely help reduce the final cost of ties. Stocked in 1/4" thickness, in standard tie plate sizes: 7 3/4" x 12", 7 3/4" x 13", 7 3/4" x 14". Other sizes on special order. Withstand extremes of temperature, moisture, brine, mildew, sand . . . and spikes do not have to be driven down a second and third time.

Write for further information about FABCO TIE PADS Today!

FABREEKA PRODUCTS COMPANY, INCORPORATED
222M SUMMER STREET BOSTON 10, MASS.

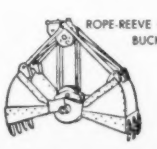
Check this list of Brownhoist features... when you're thinking of a diesel electric locomotive-crane

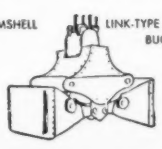
- (✓) Travel power applied direct to axles by 2 oversize inside hung spring-mounted motors
- (✓) Motor current supplied from generator direct connected to Diesel engine
- (✓) Travel speeds up to 15 MPH. for heavy duty switching service
- (✓) Helical gear reducer transmits power for hoist drums, swing, and boom
- (✓) Double disc roller bearing mounted rotating clutches
- (✓) Electric swing available at extra cost
- (✓) Cast steel rotating bed insures rigidity and permanent alignment of machinery
- (✓) Monitor-type cab provides 360° visibility
- (✓) 14" safety clearance between car body and rotating bed
- (✓) Roller bearings at all essential points

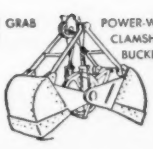
CAPACITIES 30 TONS AND UP

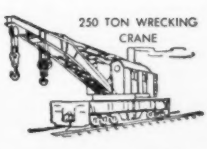
Only in the new Brownhoist Diesel Electric Locomotive-Crane can you check affirmative throughout this list of features that mean faster, safer, easier and more economical materials handling and car switching. Why accept less when it costs no more! Be sure you get the *best* when you invest.

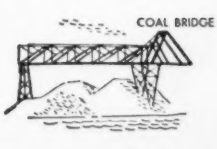
BROWNHOIST BUILDS BETTER CRANES


ROPE-REEVE CLAMSHELL BUCKET


LINK-TYPE ORE GRAB BUCKET


POWER-WHEEL CLAMSHELL BUCKET


250 TON WRECKING CRANE


COAL BRIDGE

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, CLEVELAND, CHICAGO • AGENCIES: DETROIT, BIRMINGHAM, HOUSTON, LOS ANGELES, PORTLAND, SAN FRANCISCO, SEATTLE, SPOKANE, CANADIAN BROWNHOIST LTD., MONTREAL, QUEBEC.

Now Ready!

New, enlarged ninth edition

THE ENLARGED, revised ninth edition of "*Design and Control of Concrete Mixtures*" is now available. Write for your free copy today. It is distributed only in the United States and Canada.

This handbook has been a valuable aid to engineers, architects and contractors for more than 20 years. Packed with graphs, tables and illustrations, it helps you obtain quality concrete for any job.

In designing concrete mixtures strength frequently is overemphasized. ***Strength*** is important but it should not overshadow the other two essentials of quality concrete: ***durability*** and ***workability.***

Quality concrete design achieves a balance between all these important requirements:

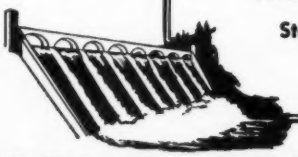
1. A workable mix that can be placed easily and quickly.
2. Durability to resist the wear of time and weather.
3. Finished concrete strong enough for the intended use.
4. Economical use of available materials.

Because of concrete's superior qualities and unusual versatility, it is used for more architectural and structural purposes than any other building material.

Concrete is firesafe, decay-proof, storm-proof and verminproof. It lasts so long and costs so little to maintain that it is truly ***low-annual-cost*** construction. With all its rugged structural properties, concrete also can be molded economically into distinctive edifices of lasting beauty.

To obtain the full measure of concrete's advantages requires the right design, proper selection of materials, careful on-the-job control of mixtures, correct placement and curing. "*Design and Control of Concrete Mixtures*" is a handy reference manual that helps you attain this result.

PARTIAL TABLE OF CONTENTS

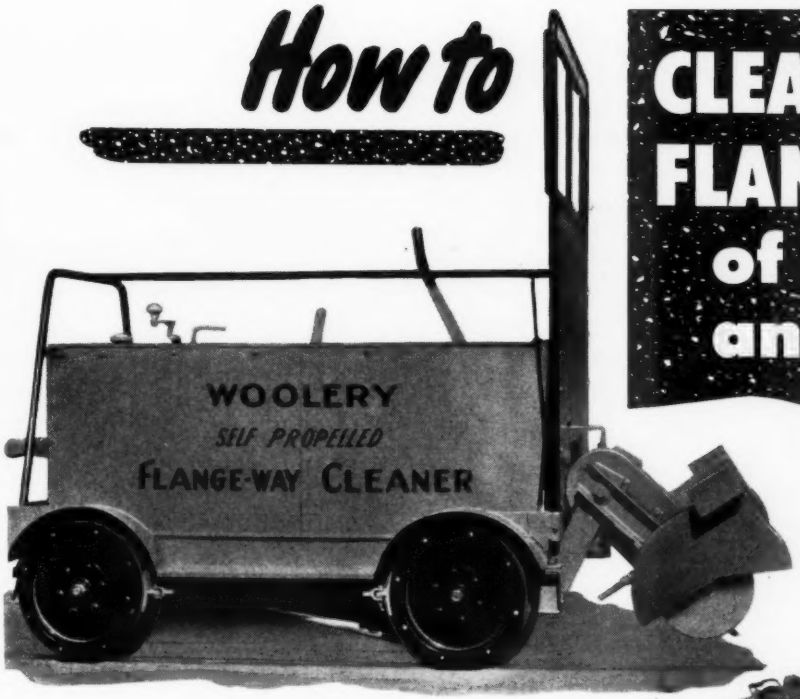


PORTLAND CEMENT ASSOCIATION

DEPT. 12-27, 33 W. GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

How to CLEAN FLANGEWAYS of snow and ice



Woolery No. 300 Self-Propelled Flangeway Cleaner

- EASIER
- FASTER
- BETTER

Woolery Model FC-1 Portable Flangeway Cleaner

NOW greater operating safety can be provided by eliminating derailment caused by ice and snow in flangeways at crossings and alleyways. Just one operator with one of the two new Woolery Flangeway Cleaners can keep many crossings clean and safe for heavy rail traffic.

By applying modern power to the problem of cleaning ice and snow from flangeways, each of the two new Woolery machines clean flangeways much better and in just a fraction of the time formerly required. In addition, these machines quickly pay for themselves through greatly reduced maintenance costs.

The Woolery No. 300 Self-Propelled Flangeway Cleaner shown above has two circular cutters that are lowered into the flangeway to a predetermined depth by a convenient hand lever. Unit has 4 wheel drive for greater traction. Two speed transmission in either forward or reverse. Selective differential is provided for use when machine is removed from tracks.

The Woolery FC-1 Portable Flangeway Cleaner will remove ice and snow as fast as a man can walk. Circular steel cutter, with hardened cutting bits, is lowered into flangeway to a predetermined depth from 1¼" to 3¼".

Heavy steel guards deflect snow and ice from flangeways and the operator. Fast starting, powerful engine assures dependability and economy.

WRITE TODAY FOR COMPLETE SPECIFICATIONS. PROMPT DELIVERY.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS • MOTOR CARS • TIE CUTTERS • TIE SCORING MACHINES • RAIL JOINT OILERS • CREOSOTE SPRAYERS • BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

COMPRESSION

Rail Anchors

Rail closely-held against traffic in both directions pays off in all-around lower maintenance. Uniform expansion at the rail ends—less respacing and re-surfacing of ties—reduction in joint wear—these are all important by-products of two-way holding.

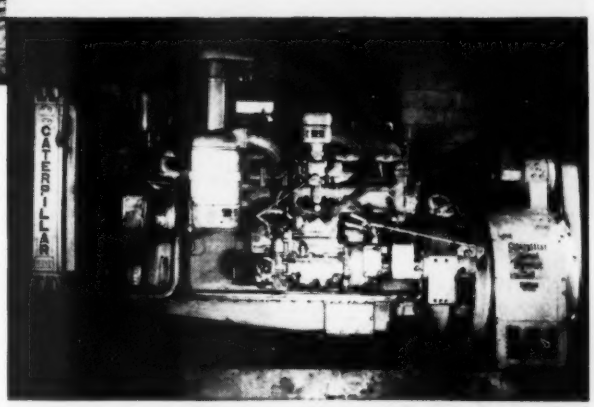
THE RAILS COMPANY

General Office

178 GOFFE STREET, NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

Serves the whole town, works 'round the clock



HERE'S a faithful "public servant" for you! It's a "Caterpillar" Diesel Electric Set that was given the gruelling day-and-night job of supplying light and power for the entire town of Bond, Colo.

Installed by the Denver & Rio Grande Western, it powers the roundhouse, a 15-hp. water pump, 15-hp. coal chute motor, 15-hp. cinder pit motor, 10-hp. lathe motor—and, for good measure, lights for a hotel, an apartment house and a number of individual residences. It's virtually a complete "utility" power plant in itself.

Railroads have long recognized the versatility and dependability of "Caterpillar" Diesel power—in stationary engines and electric sets, in 44-ton locomotives, in motor graders, in shovels and draglines, and in track-type and wheel-type tractors with their various auxiliary equipment for economical construction, yard and right-of-way work. The D. & R. G. W. is one of the most ardent users. It owns and operates "Caterpillar" units of nearly all types from one end of the line to the other.

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

Says Foreman R. J. Gerth:

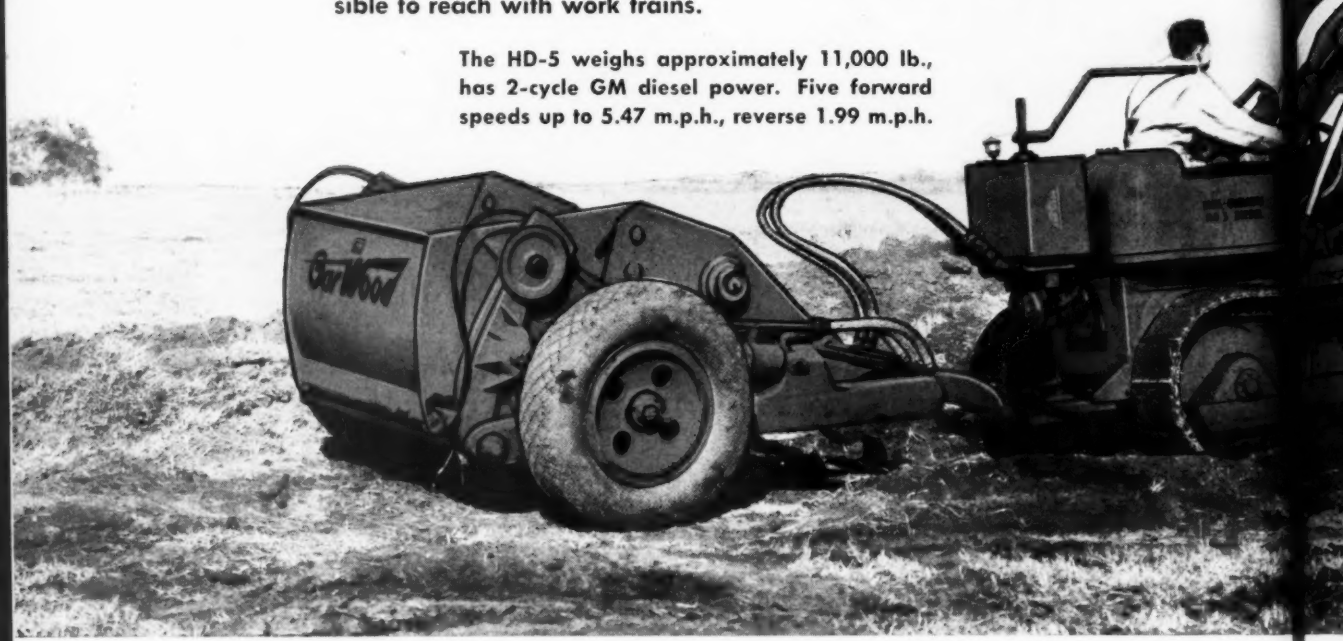
"We've run this 'Caterpillar' Diesel Electric Set almost continuously since installed, with very little or no expense. We like it swell."

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

ONE TRACTOR...

No interruption to either traffic or construction. **This husky Allis-Chalmers HD-5 with Gar Wood scraper and Tracto-Shovel works free of the tracks, moves earth hour after hour without loss of time . . . goes anywhere, handles jobs impossible to reach with work trains.**

The HD-5 weighs approximately 11,000 lb., has 2-cycle GM diesel power. Five forward speeds up to 5.47 m.p.h., reverse 1.99 m.p.h.



THERE IS A RIGHT SIZE AND TYPE ALLIS-CHALMERS

ANY OFF-TRACK CONSTRUCTION AND MAINTENANCE . . . MOWING, HAULING

CRAWLER TRACTORS

Allis-Chalmers 2-Cycle Diesel Tractors work with all types of auxiliary equipment on railroad construction or maintenance. Start instantly, operate economically on diesel fuel. Maintain drawbar pull over wide speed range with less gear shifting — spend more time moving dirt. Positive-seal truck wheels and idlers need greasing only once in 1000 hours. Four models — from the 11,000-lb. HD-5 to the world's largest, 40,000-lb. HD-19 which has exclusive torque converter drive.

MOTOR GRADERS

A-C self-propelled motor graders are heavy-duty outfits, with smooth GM 2-cycle diesel power. Have extra clearance, offer a full range of blade positions. Handle bigger loads faster and require less power with "Roll-Away" moldboard. Material is rolled, not pushed. Steering and operation simplified — full visibility, electric gauges, larger clutch. Three models: 104-hp. AD-4; 76-hp. AD-3; 50.5-hp. BD. AD-4 weighs 21,600 lb., BD 17,300 lb.— balanced for fast traction and control.

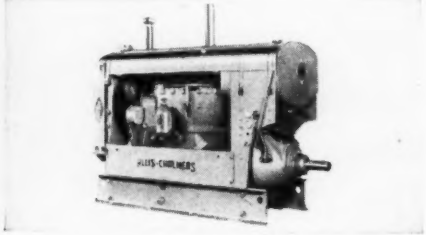
WHEEL TRACTORS

A-C Wheel Tractors are compact, powerful. Ideal for hauling, mowing, sweeping, bulldozing loose materials. Electric lights and starting. Power take-off and accessories as desired. Kerosene, gasoline or distillate. Five models — 4-wheel and tricycle designs. Model B Mower handles slopes 60° above and 45° below horizontal. Heavy-duty 5-ft. cutter bar is always within full view of operator — quickly raised and lowered by hydraulic lift. Belt drive allows slippage of sickle if bar hits any obstruction.

...MANY JOBS

MACHINE FOR ...

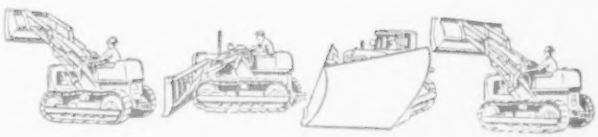
POWERING TOOLS, etc.



POWER UNITS

Allis-Chalmers Power Units are high in torque, provide heavy-duty power for pumping, operating air compressors, driving tools — any requirement, steady or intermittent. Mass produced for lowest cost, along with engines by the thousands for tough tractor service. Compact, self-contained, protected from the elements. Accessories to fit application. Nation-wide service facilities. Gasoline, low grade fuel, natural gas, butane. Five models to choose from: 24 to 110 max. b.hp.

An all around, year 'round machine — that's the Allis-Chalmers HD-5 Tractor. Interchangeable Tracto-Shovel attachments make it a . . .



SHOVEL . . .	BULLDOZER . . .	SNOW PLOW . . .	SNOW LOADER
1-yd. standard bucket, tractor width	Heavy-duty 75½-in. and 96-in. blades	All-Purpose V-type	2-yd. special bucket

Also with ¾-yd. NARROW BUCKET, ROCK BUCKET and BUCKET TEETH

Here is an ideal outfit for all kinds of railroad work. The HD-5 digs, carries, dumps and spreads — cleans ditches, grades slopes, widens shoulders, backfills. It also plows snow or loads it, clears wrecks, lays or moves track, handles coal and ballast.

HD-5 with Baker Bulldozer is efficient off-track worker. Carco winch (circle) widens usefulness of tractor.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U.S.A.

Write for complete information, or let us put you in touch with your local Allis-Chalmers dealer.

PAGE *Welding* ELECTRODES

Welding STAINLESS?

We found out a long time ago that welding stainless steel is not always as simple as it looks. So we set out to study the problems and find the answers.

Since then we have developed the complete line of PAGE-Allegheny Stainless Steel Electrodes and Gas Welding Rods. More important, we have collected—from our Field Service men, our distributors and their customers—a valuable fund of information about welding techniques. We have been able to offer real help to many fabricators of stainless steel.

If you are welding Stainless, we suggest that you . . . . . .

ACCO

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TRADE MARK

PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

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Why the WELD?

It is true that the welded hold-down lug is the cheapest and most reliable method of holding spring against rail base under a pressure of several thousand pounds.

Any other method which is as STRONG and RELIABLE will cost more than three times as much money. Any method that delivers less strength and reliability, we feel, may result in failures.

After exhausting all other means, the welded hold-down part was determined to be the most economical and reliable. This enables us to make the 8 claims herewith not incorporated in any other anchor.

Welding time is less than one minute.

Exclusive Features

1. **All Anchor Maintenance eliminated.**
2. **Failures eliminated.**
3. **Cannot be injured during installation.**
4. **A one piece (after weld is made) two-way compression anchor.**
5. **All Springs compressed an equal amount—do an equal share of work.**
6. **Remains constantly engaged from time it is installed.**
7. **Long spring—last third of distance spring is deflected, poundage does not increase. This is a compensating factor to take up for wear and erosion.**
8. **UNIVERSAL: This two-way anchor is applicable to any weight of rail or design of tie-plate and is JUST AS EFFECTIVE ON RELAID, WORN RAIL AS ON NEW RAILS.**

The New

NO-CREEP RAIL ANCHOR

Simplicity is the greatest asset of this anchor. All we ask is that you investigate and compare the eight claims listed above as being exclusive. Write for further particulars.

G & H RAIL CONTROLS, INC.

Phone BE 8117 **5204 E. 15th St., Bill Glover Bldg.** **Kansas City 1, Mo.**

An Improved

UNITED STATES STEEL

Switch Stand

for more efficient switching

Modern design assures quick, simple operation of yard and main line switches

● Here is a switch stand consistent in design and quality with present day trackwork standards.

Conforming to A.R.E.A. specifications for ground throw switch stands, the U·S·S No. 140 switch stand provides dependable service for either main line or yard use.

Its large bearings reduce wear to a minimum and prevent wobble of targets and lamps. The hand lever socket and pinion are integral with the connecting shaft, keeping the lever and pinion firm at all times on the bearing shaft.

The U·S·S No. 140 stand can be furnished in a variety of assemblies, so that you may specify the arrangement which best fits your needs. Red and white targets are standard, but any color or pattern can be supplied.

For additional information, write to Carnegie-Illinois Steel Corporation, Pittsburgh 30, Pa.

USS

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

8-1386

UNITED STATES STEEL

Hardfacing retards wear...

ups equipment life 2 to 10 times

Hardfacing is now standard practice in leading railroad maintenance and repair shops. Why? Because an application of wear-retarding Airco Hardfacing Alloys restores worn equipment to service for periods many times greater than its normal "life". Applied to new equipment before it is placed in use, hardfacing will also increase the service life of such parts and reduce "down-time" for repairs.

For example, the illustration shows worn tamper bars being built up and hardfaced with Airco Self-hardening Rod – applied by means of an oxyacetylene torch. The cribber shoes in the background are processed in the same way. This reclamation, done at small cost, extends the service life of this equipment many times its normal span.

But this is only a small part of Airco's hardfacing story for American railroads. The cost saving possibilities of Airco's wear-resisting alloys is limited only by the ingenuity of those responsible for keeping equipment in top working order.

For more information about the utilization of the *new line* of Airco's Hardfacing Alloys, write for the 16-page booklet: "Airco Hardfacing Alloys Combat Wear." Address your nearest Airco office. (On West Coast: Air Reduction Pacific Company)

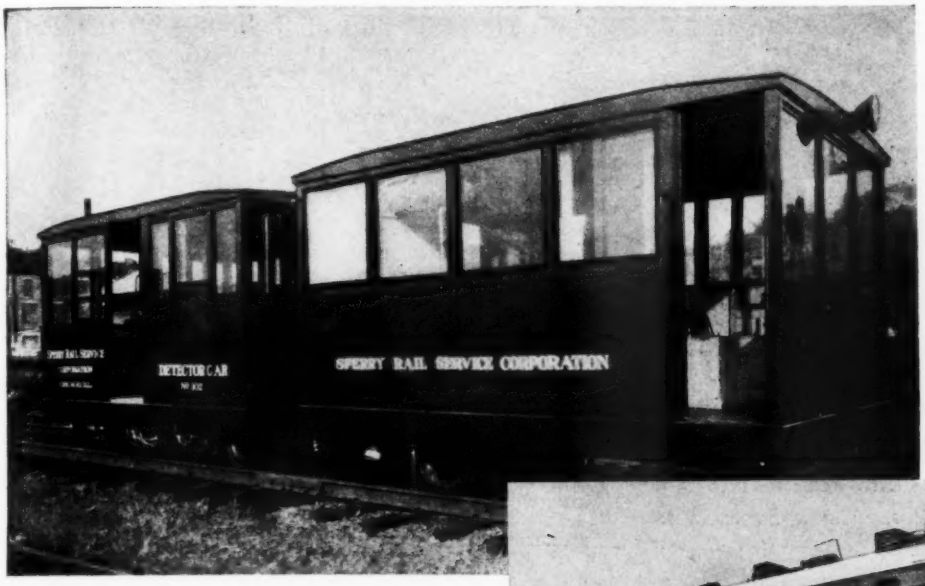
Costs Come Down under the Airco Plan

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

20 YEARS
of Sperry Rail Service



1928
1948

USED BY 124 RAILROADS

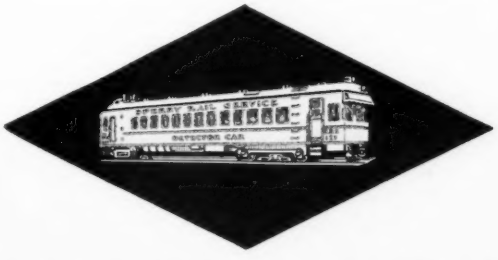
Nearly 2,000,000 miles of track tested

Over 1,000,000 defects found

Remember the time—twenty years ago this month—when we put the first Sperry Detector Car into commercial service with an historic test on the tracks of the Wabash R.R.? This car — No. 102 — was the first rail testing equipment to detect hidden transverse rail fissures in a commercial test. It pioneered the road to greater rail safety.

Today, more than one hundred railroads use Sperry's modern Detector Cars each year to find rail defects in more than 175,000 miles of track. Sperry Rail Service detects *more* and *smaller* defects than any other method of testing rail in track. *Only* Sperry cars consistently detect longitudinal defects in track.

Naturally we're proud of this record, as our contribution to modern railroad safety. And we will continue our constant research to make America's railroads the *safest* way to travel.



SPERRY RAIL SERVICE

Division of Sperry Products, Inc.

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Close to ground felling saves waste

Fast bucking and under cut bucking

Limbing from any position

Z-Z-Z-Z-I-N-G
and down it goes!

... fast, easy, and at a saving with the

DISSTON
ONE-MAN CHAIN SAW

WITH MERCURY GASOLINE ENGINE

It's only a matter of seconds . . . about 30 to fell an 18-inch tree . . . and all this power in the hands of one man. Bucking and limbing cuts take even less time. Think what speed like this can mean to you in increased production and lower timber-cutting costs!

Wherever used you can count on dependable performance, long life and low cost maintenance.

Light weight. 3½ h.p. Engine. Easy starting and stopping. Simple operation, all controls in one hand. Runs in any position, even upside down, without adjustment. Self-lubricating throughout. Weatherproof and dustproof. And it bears the Disston guarantee.

For further particulars, get in touch with your nearest Disston Chain Saw Dealer or send in coupon.

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THE RIGHT STRUCTURE for lower drainage costs

Choosing the right structure for the most economical drainage is no problem when you come to Armco. Here you can select the *one right type and size* you need.

There is plain galvanized ARMCO Corrugated Metal Pipe for normal usage—PAVED-INVERT Pipe to check erosion—ASBESTOS-BONDED Pipe where severe corrosion is a problem. For larger structures ARMCO MULTI-PLATE Pipe or Arches are prefabricated and delivered to the job site ready for immediate assembly. Where headroom is limited, a standard corrugated PIPE-ARCH or MULTI-PLATE PIPE-ARCH brings real savings. And you can always be sure of efficient, economical end treatment by finishing your standard Corrugated Pipe or PIPE-ARCH with an ARMCO End Section.

ARMCO Drainage Structures have been successfully used in railroad installations for more than 40 years. They are easy to handle and install. Job costs are low. Long, maintenance-free service is assured.

You'll find ARMCO Structures ideal for pedestrian and livestock underpasses as well as culverts, small bridges, and wherever else you need efficient, economical drainage. Write for complete information. Armco Drainage & Metal Products, Inc., 4475 Curtis Street, Middletown, Ohio.

Export: The Armco International Corporation.

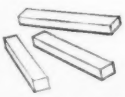
ARMCO DRAINAGE STRUCTURES

ARMCO

Here's how to PROFIT from SAVINGS with

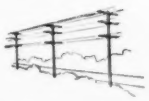
PRESSURE-TREATED WOOD

There are seven important economies suggested in this picture. How many can you spot . . . and how many are you making on *your* lines? The answer is important. For today, more than ever before, *railroad profits must come from savings.* And every place that wood is used, *pressure-treated* wood can help to cut your costs.



CROSS TIES

Your own tie records will show the economy of pressure-treated wood. Savings from this source alone averaged 20% of railroad profits during a recent ten-year period.



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The lower cost per year of full-length pressure-creosoted poles and posts has been demonstrated by countless utility and highway installations. Further—Koppers will handle your poles on a contract basis, just as your ties are handled now.

PLATFORMS

The "mechanical" failures that force frequent platform repairs generally *start* from decay. Pressure-treatment extends life, helps to minimize wear.

BRIDGES AND CROSSINGS

One major railroad reports over 40 years service from their pressure-treated wood bridges; total annual charges often run less than interest charges alone on bridges built of other materials. Koppers Crossings save on maintenance and replacement.

FIRE-RETARDANT CONSTRUCTION

Koppers CZC(FR) treatment for lumber and structural members greatly expands the possible applications for wood. Treatment gives a high degree of fire-retardance, also protects against termites and decay. A new bulletin, "Koppers Fire-Retardant Wood" gives full details.

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A Revolutionary New Locomotive Crane!

By the ingenious, patented use of direct-diesel power to the deck and electric power to the trucks, this remarkable new crane has upset all concepts of operating costs. Upkeep expense is reduced not by hundreds of dollars, but *thousands*. "Down" time for shop repairs is correspondingly less. And the work output of the new DIESELECTRIC is truly sensational.

May we send you a catalog, with full details? Just mail the coupon below.

HIGH SPEED *"Live-Boom" Action*

CREATED BY NEW, IMPROVED BOOM HOIST

★ ★ ★

● A remarkable new boom hoist mechanism brings *live-boom* action to the DIESELECTRIC. On old style cranes with jaw clutch boom hoists, the boom radius was seldom changed in operation. But here the operator has a smooth, air-controlled *friction* clutch . . . fast spur gear drive, instead of slow, inefficient worm drive . . . and a safe, efficient foot brake *plus controlled lowering speed*. He swings the boom up or down in 45 seconds. This motion is *simultaneous* with hoisting, slewing or traveling. Result: INCREASED WORK OUTPUT!

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Where is a station's heaviest traffic? In the baggage rooms . . . the freight depots . . . the loading platforms. They are the real "arteries."

Put that traffic on the right road . . . on heavy duty Mastic Floors made with Flintkote Flooring Emulsion.

This modern flooring material gives you an all-purpose floor that's all ways good. Just look at these important advantages.

1. ***Durability.*** Mastic floors made with Flintkote Flooring Emulsion take constant traffic, withstand heavy point loads . . . without shattering, and with a minimum of wear.

2. ***Maintenance.*** You can almost forget it. These heavy-duty floors do not crack or spall . . . are self-healing of minor scars and cuts. Can be patched if necessary, quickly and easily . . . and with a minimum of interruption to traffic.

3. ***Rapidly Installed.*** Either for new flooring or resurfacing, Mastic Floors made with Flintkote Emulsions are laid quickly. Can be installed over any clean, firm base, and are ready for normal traffic within 48 hours.

4. ***Better working conditions.*** Because these floors are dustless, resilient, shock-absorbing and sound-deadening, they help provide working conditions that are clean, comfortable and quiet.

And anywhere you want to spruce up a bit . . . in waiting rooms, office spaces, and the like . . . use Mastic Underlayment as the ideal leveling course beneath your decorative floor.

Get complete information on Flintkote Flooring Emulsions. Write today, and ask us to tell you how you can put station traffic on the right road with Mastic Floors.

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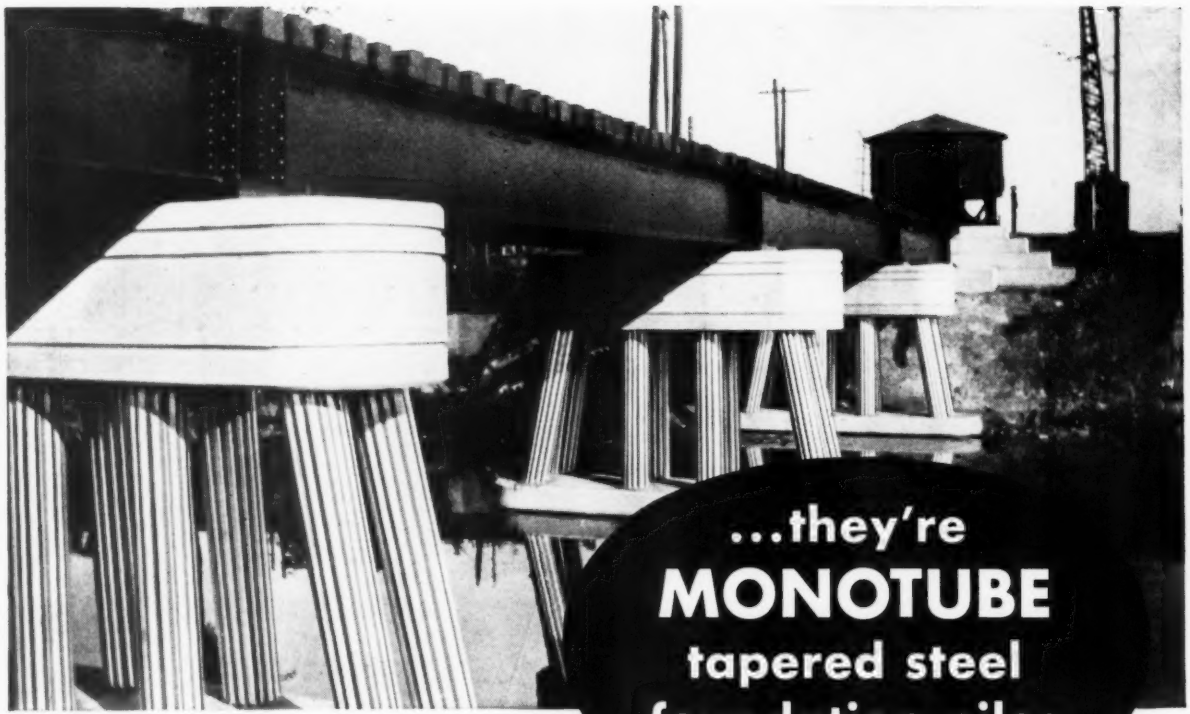
100-car freights never bother this bridge's "legs"



PICTURED above is one of many sturdy bridges built on Monotube foundations. Structurally strong and durable, it will serve well for years. Heavily-loaded freights will never strain or "bother" the Monotube tapered steel foundation piles.

Monotubes are chosen time and again for foundations. They're preferred by experienced engineers and builders because . . .

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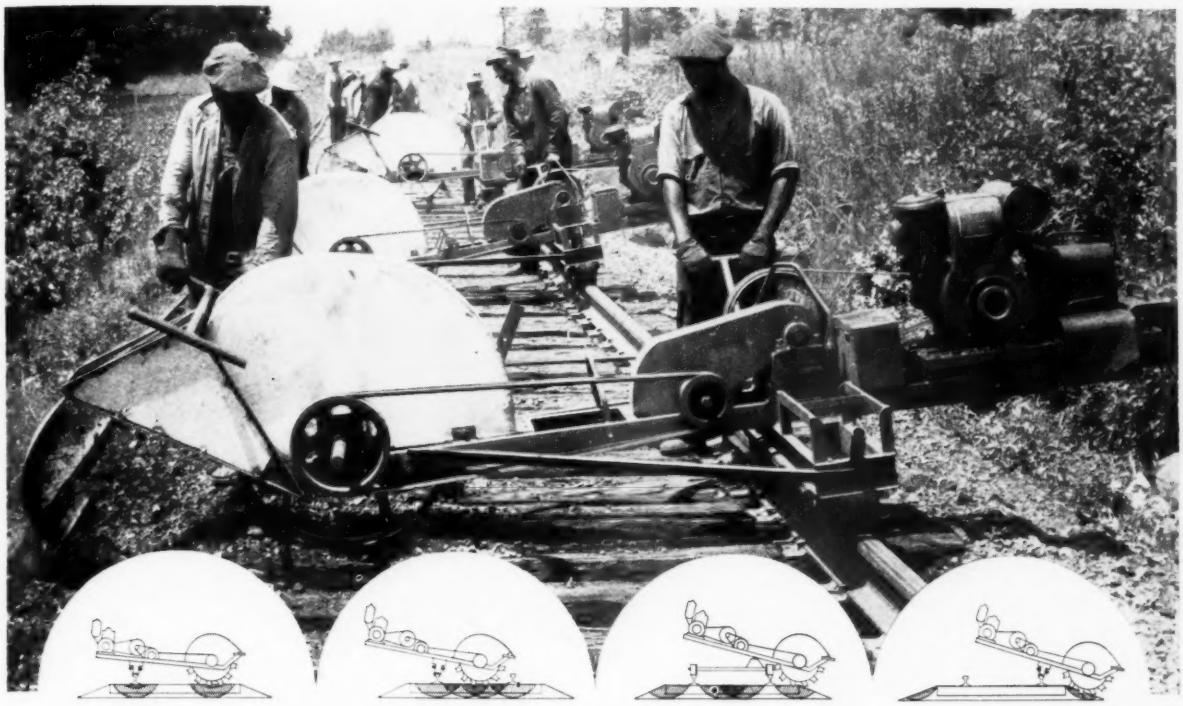
Right now you may be planning bridges, buildings, piers, airports, highways. Wherever foundation piling is necessary, plan on Monotubes. They give your projects the right start and a healthy future—make time and cost savings for you. Gauges, sizes and tapers to meet varying soil conditions. For complete information, write The Union Metal Manufacturing Company, Canton 5, Ohio.

UNION METAL
Monotube Foundation Piles

We regret the present extended delivery schedules due to the steel shortage, but you will find Monotube Piles well worth waiting for.

2 Kershaw Kribbers on trial one season put 10 on Trackwork the next!



1. RELAYING — Kershaw Kribbers remove ballast to a depth of 4 inches below top of ties—sweep tie clean for adzer in same operation.

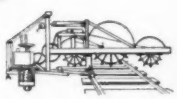
2. STRIPPING—while Relaying—Kershaw Kribbers can be used to completely remove ballast between ties and under removed rail . . . fast and thoroughly.

3. STRIPPING with rails in place—or cleaning out between tie ends ahead of ballast cleaners or retimbering side.

4. CLEANING OUT TIE ENDS ahead of ballast cleaners—Kershaw Kribbers make sure of a clean, efficient job.

4 Important Trackwork Jobs for Kershaw Kribbers

Kershaw Equipment Designed and Proved on the Job



Kershaw Three-Wheel Kribber

Kershaw Ballast Plow and Track Dresser.

Kershaw Spike Setter Carriage

Kershaw Utility Derrick (2,000 lb. capacity)

TWO Kershaw Kribbers on trial by a large midwestern railroad showed a cost saving of 60% or more over hand methods on cribbing out ahead of adzers during relaying. . . . Trackwork performance that now has *twelve* Kershaw Kribbers at work on this road!

This is a typical experience with railroads and trackwork contractors who keep close account of trackwork costs—and who are also concerned with speed and quality of work done.

An example of Kershaw Kribber efficiency are the 5,240 cribs made in one day with two of these machines! One railroad contractor estimates savings in relaying with his Kershaw Kribbers in excess of 200 man-hours per mile!

Built by a railroad contractor to save cost on his own jobs, Kershaw Kribbers are available on a trial-rental basis to prove their value on every trackwork job. Write today for detailed data and more cost-savings figures!

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LINK-BELT SPEEDER "OFF THE TRACK" EQUIPMENT

Expedites, Simplifies, Reduces Costs on Maintenance and Construction

The term "off-the-track" makes clear the principal advantage of the crawler type shovel-crane for railway construction and maintenance. The Link-Belt Speeder machines illustrated are all working freely and entirely independent of the rail traffic. It is also obvious, that a crawler or wheel mounted unit can operate at any distance from the rails, as in the

Grading and cutting ditch along right-of-way.

After levelling the road bed with dragline, the Link-Belt Speeder is placing ties and laying rails.

case of a power shovel digging and loading ballast in a quarry, or excavating or building beyond the rails. The machine can be maneuvered into its most advantageous operating position, when it is off the rails.

The Link-Belt Speeder line of Shovel-Cranes ranges in capacity from the ⅜ cubic yard up to the 3 cubic yard size, and each machine can be readily converted to use as shovel, crane, dragline, clamshell, pile driver or trench-hoe. Earth moving operations such as grading or ditching are commonly performed using the dragline bucket, which is also useful in handling sand and gravel in stock piles. The dragline gives the unit its widest area of operation, the power shovel works in a more limited area, but supplies greater digging power, as required in rock cuts, for example. The same boom will permit the use of clamshell or dragline, or hook-block or slings for handling rails, structural steel or other types of material in loading, unloading or construction work.

Half yard dragline replacing fill after construction of bridge.

Building levee on river bank to protect railway right-of-way against flood damage.

There is a Link-Belt Speeder distributor near you, equipped and trained to supply quick, courteous, efficient sales or service on all types of Link-Belt Speeder Machines. Call on him for detailed explanation or demonstration of the broad line of Link-Belt Speeder Shovel-Cranes.

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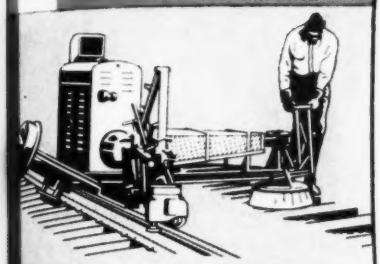
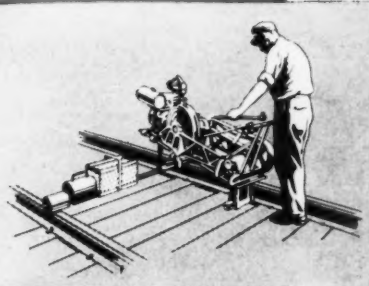
NORDBERG *Sets the Pace for* MECHANIZED MAINTENANCE MACHINERY

FOR MORE than twenty years, the name NORDBERG has been synonymous with outstanding development in machinery used for track maintenance. During these many years, Nordberg developed equipment that revolutionized maintenance methods and which today has become standard equipment wherever track work is done. The experience that has led to these developments is continuing to work toward new and better machines that will further improve the quality of track work, do the job faster and at less expense. Call or write for literature describing Nordberg maintenance machinery.



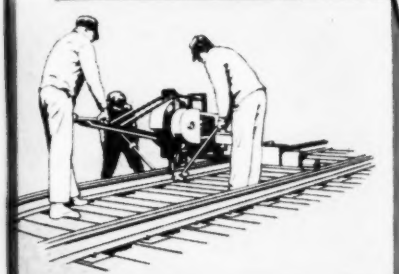
ADZING MACHINE

Provides tie seats in keeping with today's track maintenance standards. All level and in same plane.



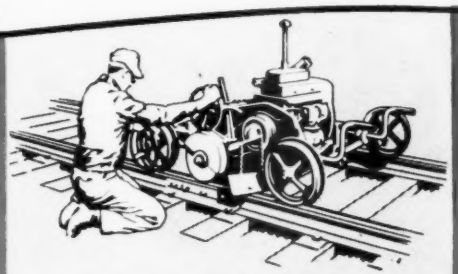
TRACK WRENCH

Provides uniformly controlled tightening on track bolts. Prolongs rail life and makes better riding track.



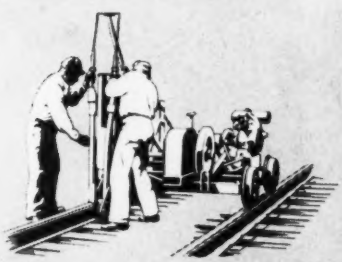
SPIKE HAMMER

All spikes driven straight and at big savings in time and labor.



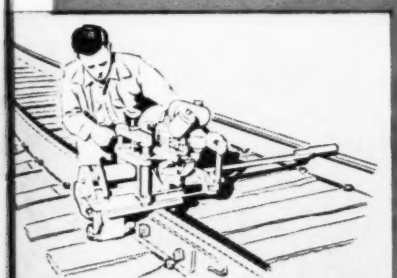
RAIL GRINDER

With four types of grinders, Nordberg can supply the machine best adapted to any type of maintenance grinding.



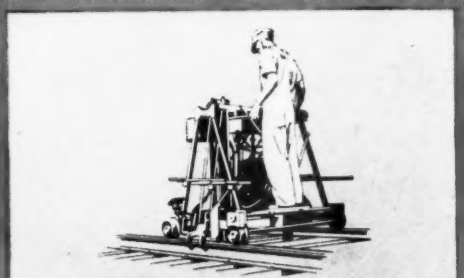
SPIKE PULLER

By getting spikes out faster this machine speeds up relaying and reduces the cost of the entire operation.



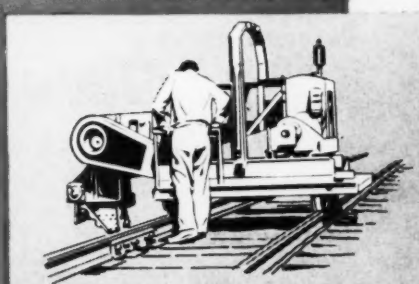
RAIL DRILL

A compact, lightweight, low-cost, easily set drill that proves a money saver wherever rail must be drilled.



POWER JACK

For better surface and alignment where track is raised on ballasting and surfacing jobs.



CRIBEX

Removes foul ballast from tie cribs with no damage to ties or rail.

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NORDBERG TRACK MAINTENANCE MACHINERY

Saves time — Does better work — Reduces expense

NEW!

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CP-455-L with lever throttle and quick release retainer. Push type throttle handles available.

with a high velocity jet blow

This new CP-455 Pneumatic Chipper has a built-in high velocity air jet which cleans off the work surface as though a blow gun were built into the tool.

A new type of non-wearing "Pulley-valve" and throttle regulate the force of the blow from a tap to a heavy hammer-stroke, making the CP-455 an all-purpose scaler. Ideal for chipping weld flux, paint, rust, scale, soot and dirt, and a dozen other applications. Immediate delivery. Write for Bulletin SP-2089.

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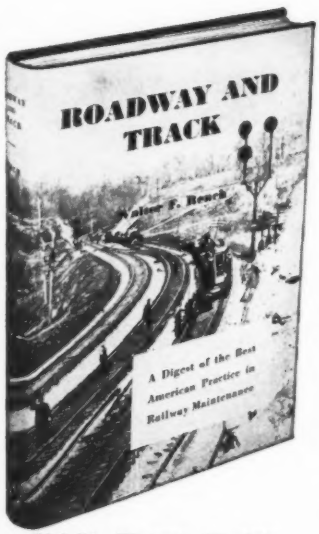
With Supplement Bringing Information Up to July, 1948

ROADWAY AND TRACK

By Walter F. Rench

Formerly Supervisor on the Pennsylvania Railroad;
Author of *Simplified Curve and Switch Work*



Third Ed. 350 pages, 101 photographs, 19 line drawings, 12 tables, index, 6 x 9, cloth, $5.00.

The third edition features the use of the latest mechanical equipment in connection with roadway and track maintenance. Older methods employed where full mechanical equipment is not available are also explained. While most of the methods described are those which are standard on the *Pennsylvania,* A.R.E.A. recommended practices and those in use on other well maintained roads have also been included.

Outstanding types of mechanical equipment used in track work are described and illustrated with action photographs. Engineering drawings show working details. The economies resulting from the adoption of modern methods are clearly outlined. Useful tables have been added to make the book suitable for reference use, as well as a practical handbook on modern methods.

For Track Supervisors

While written primarily to serve the needs of track supervisors and other maintenance officers, the new edition contains material of considerable interest to transportation and mechanical officers who require a working knowledge of the fundamentals of maintenance of way practice. Section and extra-gang foremen, who wish to acquire a broader knowledge of their work and of methods used elsewhere, will find the book helpful.

CONTENTS

Part I—ROADWAY: Essential Elements in Roadway Maintenance—The Right of Way—Drainage of Roadbed and Track—Vegetation for Banks—Economics of Roadway Machines—Labor Saving Methods and Devices in Roadway Work—Small Tools and Their Uses.

Part II—TRACK: Essential Elements in Maintenance of Track—Program for Maintenance of Way and Structures Work—The Track Obstruction—Power Machines and Equipment—Labor Saving Methods in Track Work—Track Materials and Their Uses—Practice in Rail Renewals—Practice in Rail Repair and Inspection—Maintenance of Main Tracks—Maintenance of Yards and Terminals.

Part III—SPECIAL PROBLEMS AND DUTIES: Maintenance Problems and Methods Used—Economics of Track Labor—Special Duties in the Maintenance of Way Department.

SUPPLEMENT: A 10-page Supplement describing new A.R.E.A. recommendations and changes up to July 1, 1948, can be cut for insertion in proper place.

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Please send me on Ten Days Free Examination a copy of the Third Edition of ROADWAY AND TRACK by Walter F. Rench. If satisfactory, I will remit the list price of $5.00. Otherwise, I will mail the book back postpaid, without obligation.

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The ease of application and the long life of Koppers Protective Coatings hold maintenance expense to a minimum. Koppers representatives will gladly help you select the Koppers Coatings that will solve your plant's corrosion problems. Write us for further information. *Trade Mark Reg. U. S. Pat. Off

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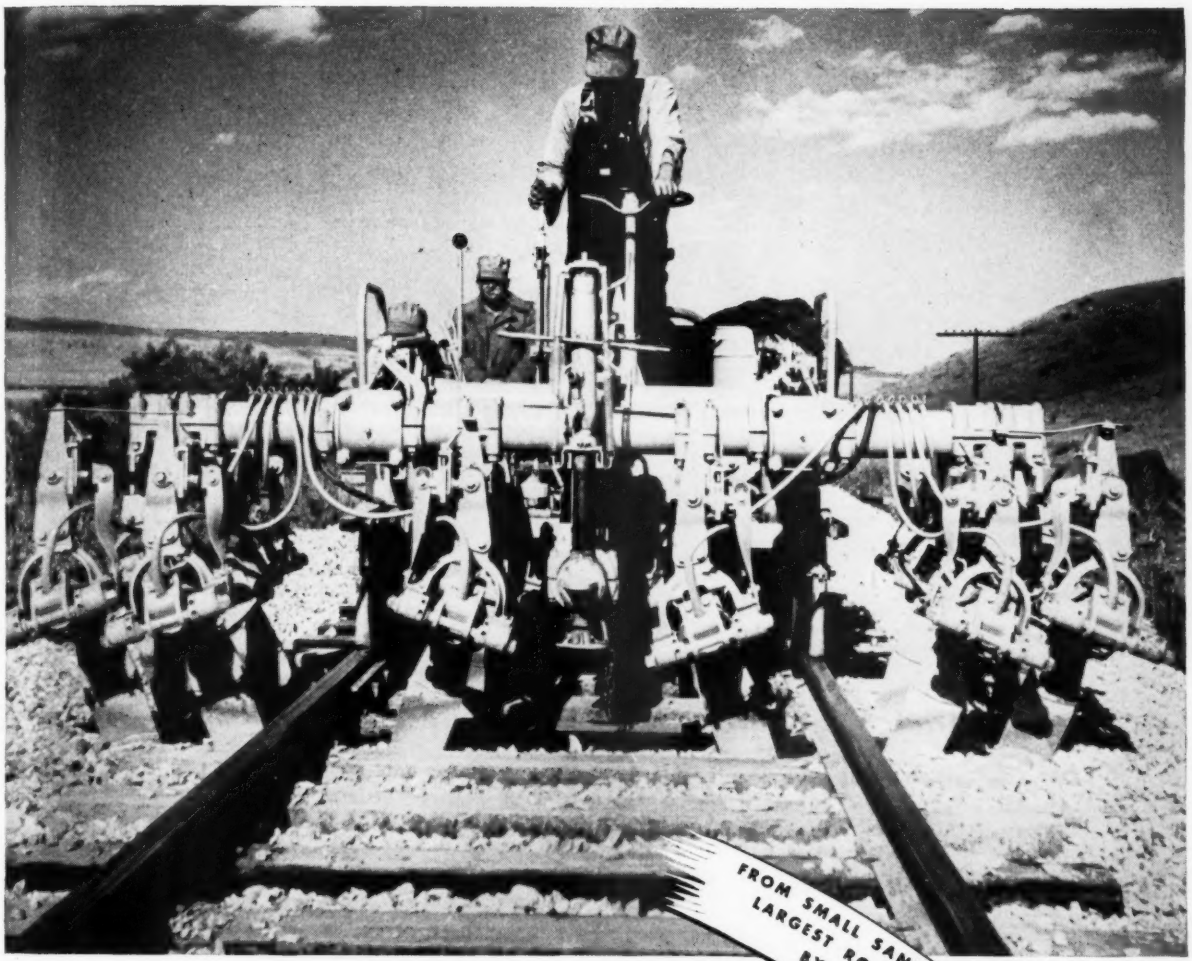
Dept. 1208T • Pittsburgh 19, Pa.



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Working in tandem, two of these machines will usually double the daily footage without materially increasing the gang ahead of the machine.

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Mich.

No. 240 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: Serving Two Masters

December 1, 1948

Dear Readers:

You have heard it said of old times that no one can serve two masters, and yet, that in effect is what Railway Engineering and Maintenance does all the time—in every issue. And we have reason to believe that we successfully belie the old proverb.

In the first place, we serve you railroad men by bringing to your attention monthly in our pages the latest developments in your specific field, going far and wide to search out and present effectively the things which we feel will be of most interest and help to you. In the second instance, we render an invaluable service to the railway supply industry by affording those in that industry an effective, economical and authoritative medium through which to tell you of the materials, equipment, tools and services that have been developed, and which are being constantly improved, to meet your requirements or to assist you in your work.

Our two masters, therefore—in the sense that we serve both—are you railroad men and your friends in the railway supply industry. The medium of that service is, of course, our editorial pages and our advertising pages—one complementing the other. And, happily, there is nothing incompatible in this dual service, because, in the last analysis, both groups of pages are designed to serve you both—readers and advertisers. Which of these groups of pages accomplishes this result to the greatest extent may be open to question, but we have almost constant evidence that, together, they make a distinct contribution to you both.

One of the most recent evidences of this contribution is contained in a letter received from J. F. Canning, vice-president of the Southwestern Petroleum Co., Inc., Ft. Worth, Tex.,whose product—the Zone treatment for the protection of timber bridge decks against fire—has been described in both our editorial pages and our advertising pages. In his letter, dated November 2, Mr. Canning tells of the "surprisingly good" returns his company has received from the publicity gained through our pages and the subsequent distribution of these pages, in the form of reprints, to a selected group of railway men.

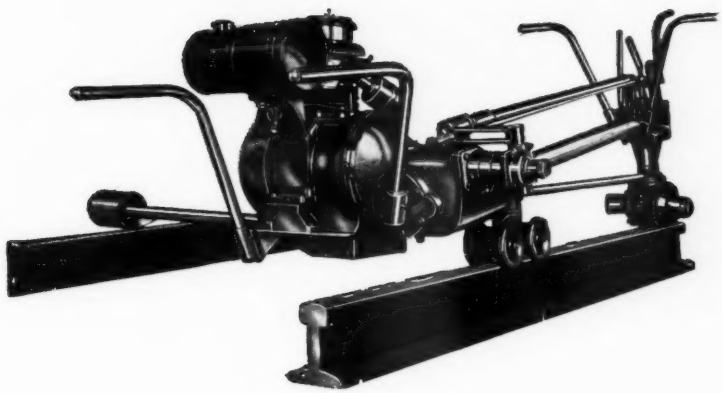
"We are not kidding ourselves", he says, "that comparable returns could have been had without using RE&M as a vehicle. The idea of the fire prevention treatment, basically sound as it is, had to have the prestige of recognized authority and publicity to gain the reception it did."

Such comments are, indeed, gratifying—for they afford proof again, if any were needed, that we are successfully serving our two masters—you railroad men, who in this case were certainly benefited by both the articles and advertising pertaining to the Zone treatment, and those railway supply companies which use our advertising pages regularly and effectively to bring you their messages. Putting it another way, they afford further proof that Railway Engineering and Maintenance forms a highly effective meeting place for user and producer—buyer and supplier.

Sincerely,

Neal D. Howard
Editor

NDH:ag



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It can be locked with a car seal preventing unauthorized change.

Railway Engineering and Maintenance

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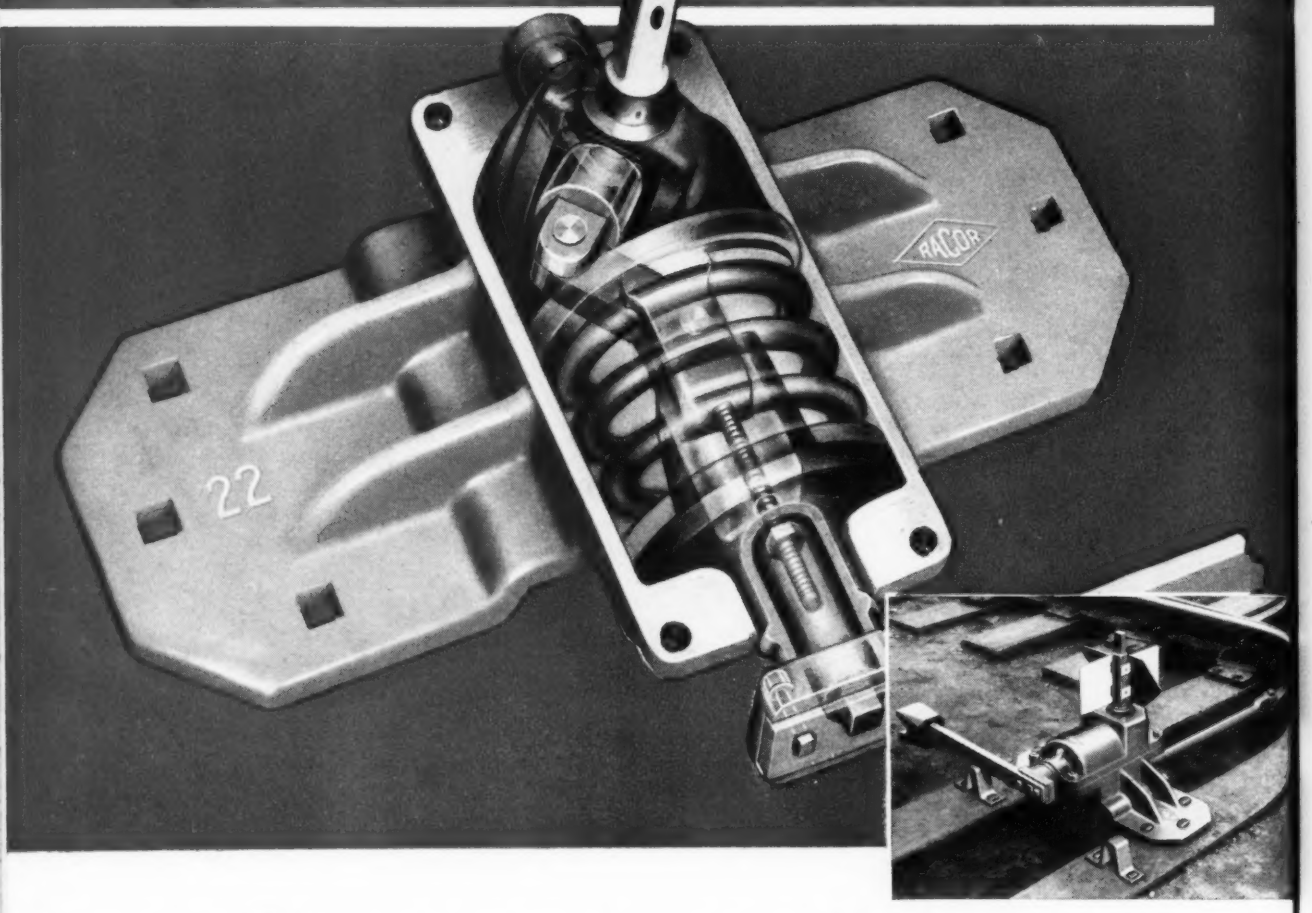

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Railway Engineering and Maintenance

Passenger Service—

Employees Can Help Pull It Out of Doldrums

If a man, running a business, found he was "losing his shirt"—not because he did not have quality merchandise, not because his service was poor, not because his prices were out of line, but because the public *thought* his product inferior, his service bad and his prices high—he had either better get out of business, or, by proper merchandising, sell the public the true facts in the case. If he chose to "fight it out," fortunate he would be if he had 1,300,000 loyal employees to shout "Buy Barneys."

The railways are in much the position of such a businessman as regards their passenger service. The quality of such service, from every standpoint, is up, but traffic and revenues are down—yet how many of the 1,300,000 employees on the railroads, each with a very personal stake in the business, are so much as whispering a good word for their passenger service, not to mention selling its merits to their friends and acquaintances?

But do these employees know enough about railroad passenger service to make enthusiastic salesmen? If not, they can hardly be expected to correct popular misconceptions and successfully sell railroad service. Here are some facts about this service that may be enlightening and helpful.

Ever since the recent war years railroad passenger traffic has declined, continuing its downward trend during the last twelve months; operating costs have zoomed to new heights; and revenues—in spite of fare increases —have continued to fall off. Has this been the result of poorer service? Everyone should know to the contrary. Never before in history has railroad passenger service been better. Constantly since the war, passenger equipment and train schedules have been improved, in spite of the inability of the builders to keep abreast of orders for both cars and locomotives.

Today, though little realized, there are 119 different streamliners, embodying 249 complete trains, operating on 41 railroads of the country. These trains, which include 19 installed during the last 12 months, operate a total of 174,568 miles each day of the week. In addition to these luxury liners, the number of which is constantly increasing, numerous so-called standard trains offer fast, comfortable—if not luxurious—transportation, benefited by the infiltration of new equipment into their consists, schedule speed-ups, and general refinements in the service they provide.

And what about the cost of this improvement service to the public—which many are beginning to resist or complain about? True, passenger fares and the cost of Pullman accommodations have been increased and are burdened with a 15 per cent federal transportation tax. But how many realize that, despite increases since the war—excluding the federal tax—passenger fares are generally no more, and in many instances are less, than those which were in effect for many years prior to 1936? The plain fact is that railroad passengers today enjoy, at lower basic rates, many conveniences and services unknown when fares were higher.

And what about dining car service—the too-often popular conception of which is tainted with the stigma of inferior quality and high prices, with the railroads rolling in profits? Surprising though the facts may be—rather than being a restaurateur's dream, dining car service has long presented the railroads with a dilemma. Expense and revenue figures for the railroads as a whole show that such service was unprofitable as far back as 1918. The abnormally heavy traffic of the recent war years saw this service almost break even, but by 1947 the cost of the service again far exceeded revenues—to the tune of approximately $45,000,000. At the same time, dining-car equipment has been revolutionized on many trains; menus have been restored in quality and range of selection; waiter service has improved

in promptness and courtesy; and prices, while up, are little, if any, more than those asked in first-class restaurants and hotels.

And have the railroads something to talk about in the safety of their passenger service? The fact is that, while often overlooked or little realized by the public, the railroads offer the safest means of inland transport. Passenger deaths on the railways in 1947 stood at 0.16 per 100 million passenger-miles, compared with 3.2 on the air lines. Thus, the air lines' death ratio was 20 times that of the railroads. It is true that the passenger injury rate on the railroads the same year was 9.0 (including all injuries, even while boarding or walking through trains), while that of the air lines was 0.04, but the most important conclusion to be drawn from these figures is that very few people ever survive a serious air accident. Even in the case of city and interurban bus lines, the passenger death rate was higher than on the railroads.

These are but a few of the things railroad employees should know about the passenger business offered by their industry. True, selling passenger service is not the primary function of those in the engineering and maintenance departments, but, in their own selfish interest, they and the employees in every other department, should know these facts, and should never overlook an opportunity to use them to correct public misunderstanding and to promote increased passenger business. Certainly, if 1,300,000 of them talked "Ride the Rails," it would go a long way in taking the sag out of this costly end of the railroad business.

Bridge Jobs—

Bold Thinking Needed for Best Results

WHEN important bridge work is done, such as the changing out of entire spans or work on vital members that involves weakening them temporarily, the bridge man has two major considerations, and he must be careful not to neglect one to the advantage of the other. One consideration is the necessity of minimizing interference with traffic, and the other is the need for keeping cost within reason. In satisfying both considerations great opportunities are presented for the exercise of original thinking and ingenuity.

If such projects may be said to have anything in common it is their dissimilarity. Hardly any two of them are the same when all pertinent aspects of the work are considered—the type of structure, the character of the work to be done, and the amount and kind of traffic that is handled over the bridge. This dissimilarity shows up pointedly in the methods that have been adopted on some recent projects.

In one instance, involving replacement of a deck-truss bridge with spans of the same length, the new and old spans were shifted laterally in a single operation. In another, where some old spans were replaced with spans of a different length, the old spans were first used as falsework for the new ones, after which the latter were used to support the old spans while they were being dismantled. In a third, described in this issue, the top cover plates of the deck plate-girders in a long viaduct on the Erie were renewed by using a highly simplified and economical procedure as compared with various alternative courses of a more conventional nature that were considered.

In these projects the bridge men who conceived the procedures used apparently were able to give their thinking and imagination free rein. In achieving such a state of mind a certain amount of boldness would seem to be helpful. This means determining what the problem is in its entirety, and then finding and using the best solution to *this* problem even though it may entail a scheme that has not been tried before.

Positive Approach—

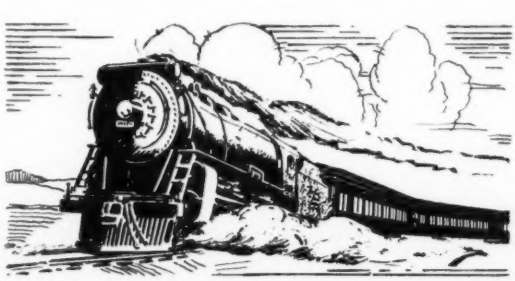
May Be What Safety Programs Need

THERE are probably many maintenance supervisors in the country who are "fed up" with the subject of safety. One accident-prevention campaign follows another, and there is a continual succession of safety meetings, with the intervals in between punctuated with letters, posters, and verbal admonitions. Under these circumstances it would not be surprising if employees of all ranks were to acquire a sort of immunity to the subject, a state of mind that may be compared to a solution that has reached the saturation point—no further material can be absorbed.

Obviously, every effort must be made to avoid such an impasse. And this can be done by finding different and more interesting or palatable ways of putting the safety idea across. Some of these other methods not only provide a different approach, but they are claimed to be more effective than those that the railroads have relied on so heavily in the past. For instance, some safety experts insist that safety performance can be greatly improved by shifting emphasis from the "don't," or negative, approach to one that is positive in character.

One phase of the positive approach consists in appealing to the employee's selfish interests, making the point that *he* has much to gain by not getting maimed or killed. For instance, when an employee is made to see that, if anything serious happens to him, the plans he has made for educating his children will be wrecked, the lesson is apt to be more effective than if the emphasis has been placed on the mere observance of a set of rules.

There is nothing new in this positive approach. The question is whether it is being used to the extent warranted by its value. If safety efforts are caught in a rut a change of emphasis from the negative to the positive would seem to be worth trying as a way of raising them to a higher level of interest and effectiveness.



During the last working season, the Boston & Maine completed a track-raising project on a 22-mi. stretch of stone-ballasted double-track main line between Boston, Mass., and Portland, Me. To speed this project it used two Jackson Multiple Tampers in tandem, the first machine tamping the initial raise, while the second unit, working about ½ mi. behind the first machine, brought the track to the final grade.

The first of two Multiple Tampers (above) tamped the track after the initial raise, while the second (left) brought the track to final grade

Two Multiple Tampers Used on Track-Raising Job

ONE OF the more ambitious maintenance projects undertaken by the Boston & Maine during the 1948 working season was the highly mechanized resurfacing of a 22-mi. stretch of the double-track main line of its Portland division, which extends from Boston, Mass., eastward to Portland, Me., 115 mi. In this project, the track was given a general lift of 4¾ in. on stone ballast, and new ties were installed at the rate of 1,023 per mile of track.

All operations were mechanized insofar as possible. New ties were spiked with the aid of pneumatic hammers powered by a small compressor. Two Jackson Multiple Tampers were employed to tamp the track, while removal of the old ties from the track and the "nipping-up" of new ties for spiking and tamping were facilitated by the use of tools developed on the B. & M. especially for this work.

Tampers Used in Tandem

Of special interest was the method employed in using the Multiple Tampers in the track-raising phase of the project. The first machine, following closely behind the tie-renewal operations, tamped the initial raise of approximately 2¾ in. The second machine, working about ½ mi. behind, then tamped the second raise of 2 in., which brought the track to its final surface. This method was adopted because it was felt that it would result in greater uniformity of tamping and would hold the surface more permanently than if one machine was used to tamp the entire raise of 4¾ in. in one operation.

Of interest also was the assignment to the project of a construction supervisor who was in complete charge of all phases of the work. This relieved the track supervisor regularly assigned to this territory of all responsibility in connection with this project, leaving him free to attend to his normal duties. The duties of the construction supervisor, in addition to supervising the daily work, included arranging for work trains and their proper make-up daily, supervision of the labor camp, and making arrangements with the operating department for the use of the track.

The track involved in this project extends from a point about ½ mi. east of the passenger station at Haverhill, Mass., to a point known as Rockingham Jct., N.H. As mentioned previously, this is a double-track line, over which approximately 18 passenger trains and 7 freight trains operate daily in each direction during the summer.

These tracks, for the most part, are laid with 112-lb. rail on 22 ties per 39-ft. panel, although a few short stretches are laid with 130-lb. material. The old ballast was of trap rock, except for a short stretch of washed gravel in both tracks. The last general resurfacing was done in 1934. The new ballast added in the recent project was also trap rock, ranging from ¾ in. to 1½ in. in size.

To assure the track forces maximum use of the track, the operating

Showing the first step in the removal of an old tie from the track, using a special tool developed on the Boston & Maine

During the tamping operation, ties were nipped up with the special tool shown here

department arranged for single-track operation daily during working hours. This was facilitated by assignment to the project of a construction trainmaster, who supervised train movements in the immediate vicinity of the work, as directed by the dispatcher, with whom he consulted frequently by telephone so that both might be kept advised of any changes or emergencies.

To facilitate single-track operation, the territory was divided into sections and temporary crossovers were installed near each end of the sections so that trains could be routed around the job during working hours.

A pilot conductor and four flagmen were also assigned to assist in handling trains around the work. A flagman was posted one mile from each end of the single-track operation and the other two were assigned to handle the crossover switches at the ends of the detour sections. The conductor rode as pilot on the engine of each train thus single-tracked. In most cases he returned almost immediately on a train moving in the opposite direction but, when this was not possible, and a following train was approaching, a motor car was dispatched to return him quickly to the starting point.

The initial step of the project was carried out on the westward track, beginning at Rockingham Jct., and working westward to Exeter, five miles. When this stretch was complete, the force returned to Rockingham Jct. and brought up the eastward track. Similar methods were followed between Exeter and East Kingston, five miles; between East Kingston and Newton Jct., four miles; and between Newton Jct. and Haverhill, at the west end of the project, eight miles.

Organization

The force employed on this work totaled 143 men, including 9 foremen, 6 assistant foremen and 8 machine operators. The initial unit of this force was employed in the tie-renewal operations and included 2 foremen, 2 assistant foremen, a machine operator and 35 trackmen. This unit, in part integrated with the force making the initial raise, used 16 small jacks to raise the track from its old bed, thus easing the work of taking out the old ties and inserting the new ones.

Spike pullers were employed in this work and removal of the old ties was further facilitated by the use of a "tie-tee"—a tool developed by the B. & M. for this type of work. This tool consists of a lightweight channel section about 9 ft. long, with a short crosspiece welded to one end of the channel to form a "T." A series of holes, large enough to admit a lining bar, are spaced about 6 in. apart in the web of the channel, near the opposite end of the tool from the crosspiece.

To use the tool, it is placed directly over a tie to be removed, with the crosspiece bearing against the web of the near rail of the adjacent track as a brace, while the other end rests on the inner rail of the track being worked. A lining bar is inserted through a convenient hole in the channel, near the inner end of the tie, and the point of the bar is brought to bear against the tie. A lever action of the bar then moves the tie toward the outside shoulder. As the tie is moved, the bar is used progressively in successive holes of the channel until the inner end of the tie has reached the inside rail. From this point the tie is pulled out with tongs or picks. The tie-tee speeds the removal of the old ties considerably, due to the high mechanical advantage of the lever principle in breaking the ties free from the ballast.

The tie-renewal force included in its equipment a light compressor for operating two pneumatic spiking hammers. In the earlier part of the summer, an Ingersoll-Rand Spot-Air portable compressor, mounted on a push car, was used for this purpose. Later, this unit was assigned to other work and was replaced with a 105-cu. ft. trailer compressor, mounted on pneumatic tires, which was coupled to a motor car and towed behind it with the tires riding on the track rails.

Tamping

The second unit of the organization was employed in making the initial raise of 2¾ in. This force included a foreman, an assistant foreman, 2 men on the Multiple Tamper and 16

One of the final operations was a light tamping of tie centers to eliminate voids

trackmen, the latter group including five men throwing in loose stone ahead of the tamper, as needed.

As mentioned earlier, the first raising force was, in part, integrated with the tie-renewal work. This permitted a single setting of jacks for both operations, as directed by the foreman of the raising force, who worked in advance of the tie-renewal gang. The 16 jacks used were allowed to remain in place until the track was tamped and were then carried ahead on a dolly, moved on the adjacent track. Four men were assigned to the jacks, two of whom were engaged in setting them, while the other two carried them ahead.

The Multiple Tamper, similar to those used in the B. & M. work, was described in detail in the May, 1947, and the March, 1948, issue of *Railway Engineering and Maintenance*.

During the tamping process, to insure that the tie plates would be in proper contact with the rail bases, the ties were "nipped" by two men, working at opposite ends of the ties, each equipped with a special nipping tool developed on the B. & M. The tool embodies a lining bar, with a rectangular section of steel plate, bent in the form of a semi-circle, attached near one end by welding, as shown in the accompanying photograph. When the point of the bar is inserted under the end of a tie and pressure is exerted at the opposite end, the plate acts as a fulcrum and causes a hanging tie to be brought up to the base of rail quickly and to be held there until it is tamped.

The initial raise was made on the old ballast. New ballast was then distributed by work train, following which the second raise was made.

The second raise of 2 in. was performed about ½ mi. behind the first unit. In most cases this permitted the first raise to settle overnight, under traffic. The force employed in the second raising unit included a foreman and an assistant foreman, 2 men on the tamping machine, and 24 laborers. As in the case of the first unit, the tie-nipping was done with the special nipping tools.

Following directly behind the second tamping machine was a "center-tamping" unit of two men, equipped with two Jackson vibratory tampers and a portable power unit, mounted on an outrigger-type dolly. These men tamped the ties lightly under the center of the track, the purpose being to fill any void along the center line and thus prevent any tendency for the machine-tamped ballast near the track rails to become loosened.

The final unit of the organization was a 14-man lining gang which, operating behind the second tamping unit, performed all clean-up operations incident to the work. Lining on tangents was done with the aid of a track-lining instrument, while that on curves was done to stakes set by the string-line method.

All track raising was done by eye with the aid of a Fairmont spot board. Grade stakes were used only on the permanent run-offs at the ends of the work and at other locations, such as at bridges, where the track was not raised. Whenever possible, the bridges, including overhead structures, were raised by carpenter forces to conform to the new grade of the track. In general, the raised bridges were temporarily supported on grillages made of short lengths of rail.

A regular work train was assigned to this project, handling an average of eight cars of ballast daily and such other material and supplies as were necessary. This train was also used to transport the entire force between the labor camp, located at Rockingham Jct., and the point of work. A foreman and eight men were assigned to the work train as a permanent force, these being included in the total force already mentioned.

As a means of "keeping tabs" on the work, the construction supervisor was required to make a consolidated daily progress report which showed the performance of each unit in the force and the cumulative total for each unit from the start of the job. Also included in the report were daily and cumulative cost data, including work-train and material costs. This was forwarded to the division office each day. In addition, a daily telegram was sent to system headquarters, containing a brief résumé of the day's work.

Production Averages

During the entire project, the first raising force averaged 2,024 ft. per day, while the daily production of the second unit averaged 2,060 ft. These averages include time lost because of inclement weather, traveling to and from work and other interruptions.

The average working time for the machines was 6 hr. 25 min. daily. Delays included an average of 1 hr. 14 min. daily for riding time and 45 min. daily for miscellaneous causes. The working day averaged 8 hr. 24 min.

The cost of this project amounted to $1.055 per ft. of track, including installing ties, but not including the purchase price of the ties or the handling charges. This compares with $1.577 per ft. on a project carried out in 1947, in which the tamping was done entirely with forks, and with $1.178 per ft. on another 1947 project in which the first raise was done with forks while the second raise was done with a Multiple Tamper. The cost figures for 1947 have been equated to compensate for wage increases since that time.

This project was organized and carried out under the general supervision of T. G. Sughrue, chief engineer of the B. & M., Boston, and H. F. Fifield, engineer maintenance of way. H. F. Tupper, division engineer of the Portland division, Dover, N.H., and F. R. Spofford, assistant division engineer, exercised more direct supervision over the work.

SPECIAL TECHNIQUE

Simplifies T

In strengthening a 3,120-ft. deck plate girder viaduct, which required renewal of the top cover plates of the girders and the addition of new cover plates, the Erie wanted to avoid the use of falsework for supporting the spans while the work was under way, or of fabricating any complete spans. Therefore, a procedure was adopted that involved an entirely new approach in handling such work. The procedure used, and other aspects of the work, are described in this article.

Above—A set of old cover plates being pulled out onto the deck of the viaduct

By A. A. VISINTAINER*
Engineer of Structures
Erie Railroad
Cleveland, Ohio

Showing how the new cover plates were pulled into position while the track was raised

IN renewing the top cover plates of a long deck plate girder viaduct the Erie adopted a scheme that involved jacking up the deck of each span, pulling the old plates out onto the deck longitudinally and pulling the new plates into position, also longitudinally. At the same time an additional cover plate was applied to all girders to give added strength. By using this plan the road avoided the necessity of changing out entire spans or of employing falsework to support the girders while the cover-plate work was done under traffic.

Structure Is 3,120 Ft. Long

The structure involved, known as the Belfast viaduct, is located at Belfast, N.Y., on the company's so-called River Line which, extending between River Junction, N.Y., and Cuba Junction, is a link in the Erie's New York-Chicago main line, and is predominently a freight line. Built in 1906-07 the viaduct crosses the Genesee river and two highways. It is a single-track deck plate girder structure, 3,120 ft. long, consisting of two 120 ft. spans over the river and twenty-four 40-ft. tower spans alternating with twenty-four 80 ft. spans, with every second 80-ft. span having provision for expansion.

The towers consist of steel-column bents, with each column supported on a separate concrete pier. The tower bent between the two 120-ft. spans is skewed to the general course of the river and is supported on a single concrete pier founded on timber piles. Maximum height from the base of rail to the bed of the river is 141 ft.

Although carrying only one track at present the viaduct was so designed that an additional line of longitudinal girders can be installed on each side of the existing spans if it is desired to provide an additional track at any time in the future. With this end in view the transverse header girder at each column bent was made of sufficient length to accommodate the additional girders and was provided with the rivet holes required for connecting them.

A footwalk approximately 5 ft. 6 in. wide was provided along the north side of the bridge. Until reconstructed in the recent project this walk consisted of longitudinal planks supported on long ties, and had a timber hand rail.

The structure is now carrying much heavier loads than those for which it was originally designed. Field inspection of the steel work showed that the top flanges of the main girders had been considerably reduced in section due to corrosion, and that an

*Mr. Visintainer died on September 27, 1948.

This Cover-Plate Renewal Job

excessive number of cracks had developed in the top-flange cover plates. Since the unit stresses in the top flanges were rather high the renewal of the top cover plates was considered necessary. While doing the work an additional top cover plate was installed on each girder to give added strength. The bottom flanges, which showed only slight corrosion, were not disturbed.

Three methods of changing out the top cover plates and adding the new plates were considered. In one scheme the plan was to replace one 40-ft. span, one 80-ft. fixed span and one 80-ft. expansion span with completely new spans. The spans replaced by these new units would be strengthened and repaired at a point off the bridge and then used to replace similar spans in the viaduct. This procedure would be repeated as the work progressed across the viaduct.

In the second scheme the main girders would be supported on falsework during the cover-plating operations. Specifically, the supporting falsework would include transverse floorbeams spaced about 20 ft. on centers. The floorbeams, in turn, were to be supported on temporary longitudinal girders, one on each side of the existing girder span, which would be framed into the header girders, utilizing the rivet holes provided in the latter girders for possible future use. This scheme would have required the use of two complete falsework spans (40 ft. and 80 ft. in length), which would have to be shifted from span to span as the work progressed across the viaduct.

The Plan Adopted

Both of these schemes were discarded in favor of the third plan which, as outlined briefly at the beginning of this article, contemplated doing the work without the use of any temporary supports. This plan was adopted on the basis of a stress analysis, involving the precise determination of impact, which showed that the unit stresses in the top flanges would not be excessive before the riveting work was completed, provided train speeds were limited to 15 m.p.h. and a definite procedure was followed in doing the work.

The scheme chosen had the advantage of being less expensive than either of the other plans considered. Its lower cost was due in large part to the fact that it precluded the necessity of fabricating additional girder spans, either for falsework or of a permanent nature. Furthermore, it would not require the use of an erection crane and work train, as would have been the case with the two other schemes each time a span was changed out or the falsework girders were moved forward.

The Belfast viaduct has twenty-four 80-ft. spans alternating with 40-ft. tower spans

Cover-Plate Arrangements

Descriptions of the old and new cover-plate arrangements for the different span lengths are given in the following:

40-Ft. Girders—The old top flanges of the girders in these spans consisted of two 6-in. by 6-in. by 5/8-in. angles and a full-length 5/8-in. cover plate. In the strengthening work the flange angles were not disturbed but the cover plate was replaced with a new one of the same section and an additional full-length cover plate, 3/4-in. by 16-in. in section, was installed.

80-Ft. Girders—The old top flanges of these members consisted of two 6-in. by 6-in. by 5/8-in. angles and three 1/2-in. by 16-in. cover plates, one of which was full length. As repaired and strengthened the top flanges each consist of the original flange angles, three new 1/2-in. by 16-in. cover plates, replacing the original members, and an additional 3/4-in. by 16-in. cover plate. The latter plate, as well as one of the 1/2-in. plates, extend the full length of the girder.

120-Ft. Girders—In these members the old top flange consisted of four 8-in. by 8-in. by 5/8-in. angles and five 1/2-in. by 18-in. cover plates, one of which was a full-length plate spliced at two points. The four original flange angles were retained; four of the old cover plates were re-used, with the exposed corroded ends renewed with new material; one of the old cover plates was replaced with a new plate; and an additional outside cover plate, 3/4-in. by 18-in. in section, was installed. The latter extends, in sections, the full length of the girder.

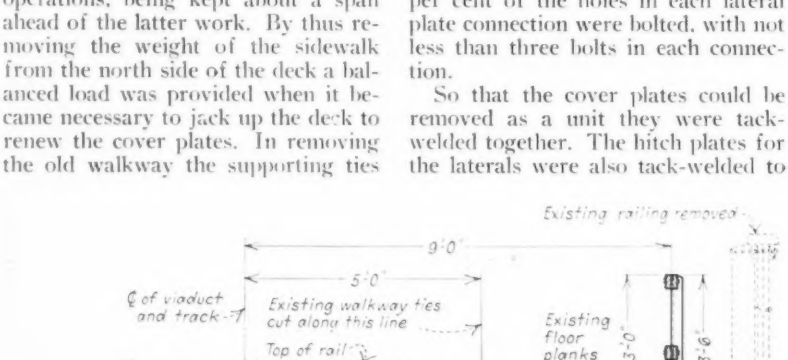
Header Girders—These members are box girders having a top flange composed of two 6-in. by 4-in. by 3/8-in. angles, and a cover plate, 3/8-in. by 27-in. in section and 15 ft. long. The original cover plate of each girder was removed and replaced with a plate of similar dimensions except that it is 1/2 in. thick.

Sidewalk Renewed First

As part of the project the original sidewalk along the north side of the bridge was replaced with a walk supported on steel brackets and having steel-angle posts to support the wood hand rails which were renewed. The old walkway planks were salvaged and re-used. The steel brackets supporting the new walkway were fastened to the intermediate stiffeners of the

girders, alternate brackets being riveted through existing holes in the stiffeners and the others welded.

The work of removing the walkway on each span was done immediately in advance of the cover-plate operations, being kept about a span ahead of the latter work. By thus removing the weight of the sidewalk from the north side of the deck a balanced load was provided when it became necessary to jack up the deck to renew the cover plates. In removing the old walkway the supporting ties were cut off on a line with the ends of the standard-length bridge ties.



This drawing shows how the walk-way was reconstructed

When the old walkway for a particular span had been removed the steel brackets for the new walkway were applied, and necessary scaffolding needed in the cover-plate work was erected outside and between the girders. Next the floor and timber railing pieces of the new walkway were placed.

The cover-plate work was started at the west end of the bridge and carried progressively, span by span, across the structure. In starting this work on a span the first step, after the preliminary work described above had been carried out, was to remove the inside metal guard rails and the outside timber ribbon guards, this work being carried out on about three spans ahead of the cover-plating. As the guard rails were removed they were shifted forward to a position in the clear of the work.

Next every third tie was removed from the span on which the cover plates were to be renewed, the purpose being to allow space for shifting the ties when working on the cover plates. All rivets were then cut out from the flanges of the girders and the connections with the laterals, new hitch plates for the laterals were installed, and the rivets were replaced with bolts in accordance with a definite plan. This plan called for fully bolting the flanges from the ends of the girders to the first intermediate stiffeners, and placing sufficient additional bolts in the flanges to make a total of 300 bolts in each 80-ft. girder and 140 bolts in each 40-ft. girder, with these bolts spaced no farther apart than every third hole. Also, 50 per cent of the holes in each lateral plate connection were bolted, with not less than three bolts in each connection.

So that the cover plates could be removed as a unit they were tack-welded together. The hitch plates for the laterals were also tack-welded to the flange angles so that the lateral system would be held in place when the bolts were removed to permit the cover plates to be changed out.

While the foregoing work was in progress the new cover plates were being brought out onto the bridge and placed longitudinally on the deck to one end of the span being cover-plated. The new cover plates for the 40-ft. girders were tack-welded together so that they could be installed as a unit, while the plates for the 80-ft. girders were tack welded together in two groups, two plates in each group.

Another preparatory operation was the setting up of two one-ton air hoists, one at each end of the span in which the cover-plate work was being carried out. Also additional ties were removed at each end of the span to provide a space about 10 ft. long through which to handle the new and old cover plates. Next the track was jacked up about 18 in. throughout the particular span and blocking placed under the ties.

Changing the Cover Plates

The forces were now ready to change out the cover plates on the two girders. For this operation, and the immediate preliminary steps, the use of the track was obtained. After the bolts in the flanges of each girder had been removed the old cover plates were pulled out onto the deck of the bridge by one air hoist while the new cover plates were being pulled into position by the other hoist, these two steps being carried out practically simultaneously. The new plates were then lined up on the flanges and re-bolted in accordance with the same plan described above, after which traffic was again allowed over the bridge.

To compensate for the additional ¾-in. cover plate added to each flange it was necessary to install run-off tie plates at the end of each newly-cover-plated span. These consisted of standard tie plates with shim plates welded to them, each tie plate having a shim 1/16 in. less in thickness than the shim on the preceding plate. Final steps in the cover-plating work included the replacement of the bolts with rivets and the restoration of the guard rails and ribbon guards. The girders in each span, including the header girders, were cleaned and painted before the scaffolding was moved forward to the next span.

Since the principal function of the ¾-in. plate which was added to the top flanges of the 120-ft. girders is that of a filler plate, it was installed in sections ranging in length from 1 ft. 8⅞ in. to 43 ft. 4¼ in. Except for the ¾-in. increase in flange thickness, the original profile of the girder was maintained. The new ½-in. cover plates which replaced the exposed corroded ends of the old cover plates were butt-welded to the old sections. This work involved no special problems. The process of cutting out old rivets, bolting and redriving rivets was similar to that outlined for the 40-ft. and 80-ft. girders.

The average time required to remove the original cover plates and install the new cover plates, during which period no traffic moved across the bridge, was about 3 hr. for two 80-ft. girders and 1½ hr. for two 40-ft. girders. The work was done by two of the company's system structural steel gangs, with the combined gangs averaging a total of about 16 men, excluding the foreman and a cook for each gang. These gangs averaged about a complete span each week.

Much Power Equipment

The power equipment used on the job included two 220-cu. ft. compressors. Current for the welding operations was provided by a 300-amp. welding generator. Each gang, as are all such gangs on the Erie, was fully equipped with power tools, including three impact wrenches, six rivet hammers, two chipping hammers, two scaling hammers, two rivet

busters, one hand-held circular saw, four reversible air motors for lag screws, other air motors for reaming and drilling, one jack hammer, one spray painting outfit, four ratchet jacks (two of 25 tons and two of 50 tons capacity), one 100-ton hydraulic jack, and two oxyacetylene welding and cutting outfits.

All the new structural steel required for this project was fabricated at the Erie's system fabricating shop at Port Jervis, N.Y. All the plates were individually laid out and punched except the full length cover plates for the 80-ft. spans, which ranged in length from 75 ft. 3 in. to 77 ft. 10½ in. One plate of each of these lengths was carefully laid out and punched. Four plates were then stacked up and rivet holes were drilled through all four at one time, using the plate already punched as a template and guide. An electrically-operated portable drilling machine was used for this operation. This method not only proved more economical than handling individual plates but was also more accurate.

In painting the viaduct in connection with the cover-plate work the new steel was cleaned with air-operated brushes and painted with a prime coat in the shop. After installation the bare spots were touched up with a prime coat as necessary before the finish coat was applied. The old steel in the main girders and headers was cleaned with power chippers, scalers and wire brushes and painted with one prime coat and one finish coat.

Special Treatment

A special treatment was applied to the outside surface of the web plates at the south ends of the header girders, which are subject to brine drip, particularly from eastward trains. The metal surface was first cleaned and then sprayed with a two to five-per cent solution of phosphoric acid in water, and then painted with two prime coats and two finish coats. The north ends of the headers are protected from brine drip by the sidewalk and did not receive this special treatment.

To bring the track at the west approach to proper grade it was necessary to raise the west end of the most westerly span 2¼ in. The necessary adjustment on the bridge seat was accomplished by removing the existing bearing plates and installing a 12-in. I-beam grillage. A further improvement was made by replacing the existing rollers at both the east and west abutments with bronze-surfaced sliding plates. The old rollers were frozen and no longer functioned.

Repairs to West Abutment

As part of the job repairs were made to the concrete backwall of the west abutment, which was badly disintegrated. In this work all poor concrete was removed, and steel plates were attached to the backwall with cinch anchor bolts to provide forms for new concrete. Diaphragms, consisting of steel plates with holes cut in them, were installed to tie the steel plates of the forms together. The forms were allowed to remain in place after the concrete was built up, and all exposed surfaces were painted.

The work described in this article was carried out under the general direction of I. H. Schram, chief engineer of the Erie, and under the direct supervision of the writer.

POWER TOOLS ON THE JOB . . .

LEFT—Drilling holes for the screw spikes with a Black & Decker high-cycle drill. Right—Running a screw spike down with the Speed-O-Matic electric impact wrench. Homelite dual-purpose generator furnished the power

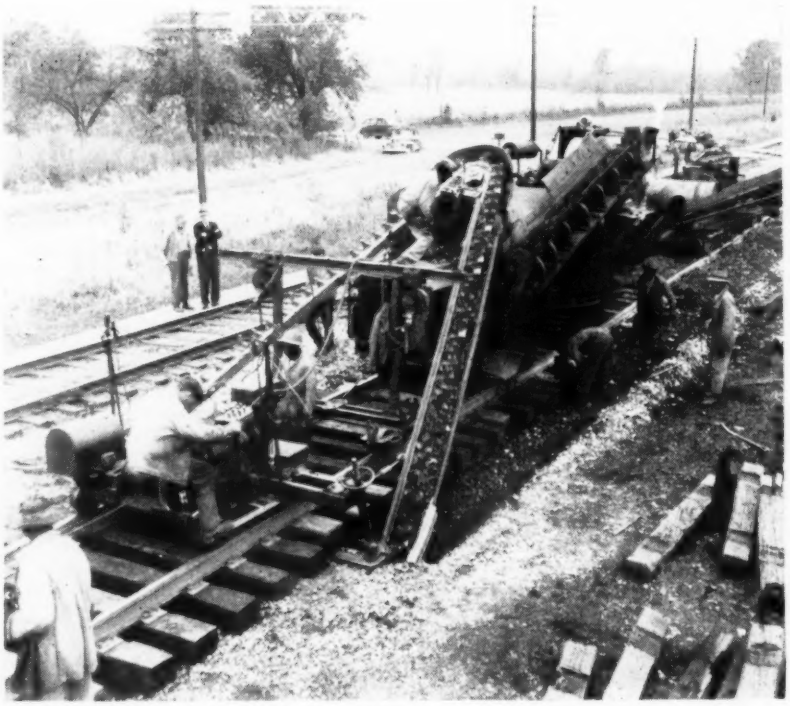
. . . Applying Buck Plates at Switches

AT Otto, Ill., a junction point on its main line, the Illinois Central applied Rushing buck plates throughout the lengths of the switches of two No. 20 turnouts and along the guard rail of one of the frogs. Each of these plates is held down by two screw spikes turned into the tie at an angle.

To speed up the work a combination of power tools was used to drill the holes and run down the screw spikes. For this purpose motor-driven tools were employed, and for the power source a Homelite dual-purpose carryable generator was used, having a capacity of 2,500 watts of 180-cycle, 230-volt current, or 2,000 watts of 110-volt direct current. The holes were drilled with either a Black & Decker high-cycle drill or a Black & Decker universal drill. All the screw spikes were run down with a Speed-O-Matic high-cycle impact wrench.

Imported Machine Cleans the Er

Experimenting with something entirely new on American railroads, the Atchison, Topeka & Santa Fe is trying out, on a rental basis, a Swiss-made ballast cleaning machine which will renovate the entire ballast section, continuously beneath the ties, to any depth up to 36 in. This article describes the machine briefly, together with the tie renewal and surfacing organizations which were set up to work with the unit.



Above—General view of the Matisa ballast cleaner working in stone ballast. Note how the digging chain passes beneath the track, elevating dirty ballast to the screen car behind. Left—The excavating chain cuts a swath 12 ft. 5 in. wide continuously beneath the track. This view shows the unit passing through a highway crossing

THE Santa Fe is playing "guinea pig" for the American railroads in trying out a new method of completely overhauling the track ballast section—shoulders, cribs, and for a depth of six inches continuously beneath the bottoms of the ties. In this experiment, which is to cover 10 mi. of track, it is operating, under a rental arrangement from the Matisa Equipment Corporation, Chicago, a large ballast excavating and cleaning machine which during the past ten years has been used in England, France, and Belgium. This machine, developed by the Matisa Company in Switzerland, was brought to the United States early in the past summer.

The result of the operation of the Matisa cleaner on the Santa Fe, combined with tie renewals and follow-up out-of-face surfacing, using a Jackson Multiple Tamper, is a completely renovated roadbed section above subgrade. Each day, following the close of the work, the track is restored to traffic at unrestricted speeds up to 90 m.p.h., with only spotting and dressing at a later date to fix the track in final line and surface.

Has Continuous Digging Chain

The Matisa ballast cleaner is a large on-track, self-propelled unit, which, by means of a continuous excavating chain threaded beneath the track structure, together with a series of conveyors and screens, digs, elevates and screens the ballast, returning the clean stone to the roadbed and disposing of the dirt clear of the track., Working in a dolomitic limestone ballast on a dead track, the unit has been cleaning from 150 to 240 lin. ft. of track an hour of actual, uninterrupted operation, depending upon the condition of the ballast. Actual daily production, which in the beginning was somewhat below what this rate would indicate, due to the fact that certain features of the machine were not adapted to the severe conditions encountered, has recently been considerably increased to the point where the output is now in the range of 900 to 1,000 ft. per day. As a consequence, the principle of operation of the machine is being definitely established as sound—that it will effectively clean the ballast from subgrade—to a depth up to 36 in. below the bottoms of the ties—and restore the cleaned stone to a point where it can be retamped under the ties.

Consists of Two Units

The Matisa ballast cleaner consists of two main units—a conveyor and screening unit, and a head-end control unit, coupled together about six feet apart. Between these two operates the continuous digging chain consisting of cutting and carrier links. The conveyor unit carries a two-tier

Entire Ballast Section

ballast screen at the rear and houses a Diesel-powered generator which furnishes power to a series of eight electric motors. These motors drive the conveyor, operate a winch which pulls the unit forward by means of a cable during digging operations, and propel the machine in a free-running condition to points of work and into the clear at the end of the day. The conveyors include one about 20 ft. long, which carries the dirty ballast to the screen, a second, 7 ft. long, which carries the clean stone back into the track, and a third, 18 ft. long, which carries the screenings out to a maximum of 21 ft. from the center line of the track. Both of the latter conveyors are pivoted to permit distribution of the run-off material where desired.

The control unit supports the forward end of the digging chain, and also contains the electric controls for all of the motors on the machine. The digging chain between these two units, with a total length of 52 ft., and a total of 78 links, extends beneath the track at the head-end control unit, and then continuously to the top of the screening unit and back to the digging point. This chain, which operates in a plane approximately 45 deg. to the horizontal, moves over a sprocket at the top, in a carrier frame, or guide, on each side. On the upside the chain carries the dirty ballast to the receiving conveyor on the screening unit. The total length of the machine from digging face to the run-off end of the conveyor returning the cleaned ballast to the track is approximately 42 ft.

Details of Operation

The Santa Fe operations are being carried out on the westbound track in double-track territory just east of Ft. Madison, Iowa, where tie renewals are averaging approximately six per rail length. All operations are being carried out on dead track, train movements in both directions being diverted around the work during the working hours. In the track renovation operations, a total force of approximately 55 men, 1 foreman and 2 assistant foremen, is being used. This organization includes about 26 men in an advance gang renewing ties, 9 men directly with the Matisa machine, and about 20 men with seven jacks, filling-in and surfacing, in the surfacing gang.

Ahead of the cleaning operations, the tie renewal gang jacks up the track from 6 to 8 in., renews the ties, and tamps up every sixth tie to hold this level and carry the ballast cleaning machine. As the advance end of the digging chain moves ahead, removing the ballast, a man places two 8-in. blocks under the ends of each sixth tie to carry the weight of the machine. At the same time, men on opposite sides of the machine, near its rear wheels, remove these blocks to permit free entry beneath the ties of the cleaned ballast being returnd to the track. To remove the blocks, a low, 20-ton Duff-Norton hydraulic jack is used on each side of the track, set in a position directly beneath the rail base.

At the rear of the machine the cleaned ballast is discharged from a swivel-mounted conveyor at such an angle and in such manner that it is projected under the ties and distributed evenly in the cribs and on both shoulders, thus giving fresh support to the track.

Directly behind the cleaner, the raising force, equipped with seven track jacks, raises the track about ¾-in. high and fork-tamps the ballast under the ties. Behind this gang comes the Jackson Multiple Tamper which, with one operator and one helper, and four men shoveling in additional ballast, tamps all ties solidly, with as many strokes as required for the proper tamping of the amount of loose ballast under the ties. Back of the tamper the track is lined, ready for high-speed service.

At night the digging chain is uncoupled at the top and, with its carrying guides, is lowered to and left in the roadbed. Next morning, with the aid of a special, dolly-mounted frame and two hand hoists, the free ends of the chain are again joined over the sprocket on the cleaning unit and the operations of the ballast cleaner are resumed. In the meanwhile, the track is open to unrestricted service for all trains.

Instrument measurements have shown that, on the average, the track thus cleaned and surfaced settles approximately one-half inch over night under the movement of 8 to 10 trains, and that the settlement is relatively uniform, both longitudinally and in cross level. Within ten days to two weeks, settlement has averaged about one inch, but again has been fairly uniform. After an interval of a few weeks the track is given a final tamping for complete stabilization. This is done by a final spotting, lining and dressing gang of about 40 men using two 4-tool Jackson electric tampers.

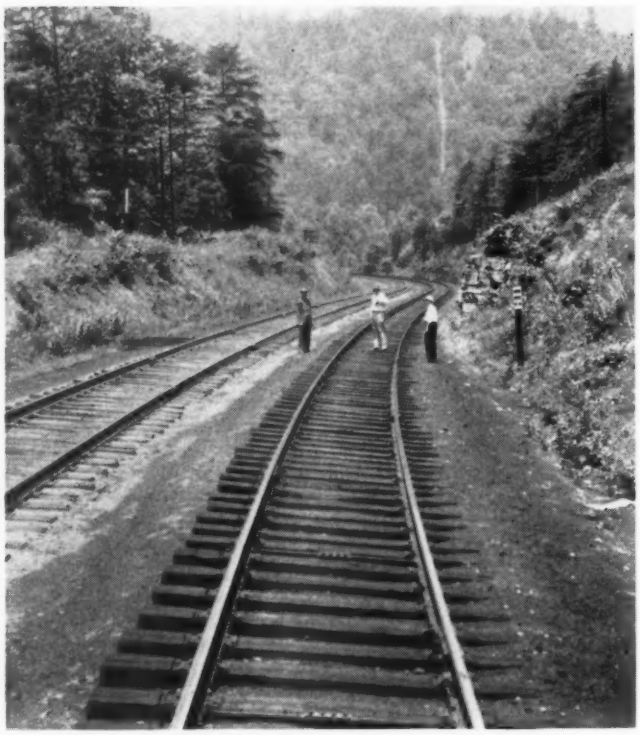
The rear end of the machine, showing the ballast screens, the dirt conveyor discharging the screenings to the far side of the track, and the short, pivoted conveyor at the rear, by means of which the cleaned stone is discharged between and underneath the ties

Maintaining Curves With a String—

More Difficult Sc

Part IV of a Series

By W. H. LORD
Assistant Division Engineer
Nashville, Chattanooga & St. Louis,
Chattanooga, Tenn.



Rock ledges, narrow cuts, high fills and fixed structures often put limitations on permissible throws, but there is a best solution for such conditions if the computer will take the necessary time to find it

EXAMPLE NO. 3, discussed in this installment, shows a curve which is more nearly like the ones which the computer will find in actual practice; that is, it is not capable of a perfect solution,. must be distorted slightly to keep it at proper distance from the adjoining track, and is composed of two curves of different degree joined by a spiral. While its readjustment is computed exactly as the previous examples, the selection of the revised ordinates becomes more of a cut-and-try proposition and the speed of solution depends more on the judgment and experience of the computer than upon any rules.

It can be considered that the small ordinates measured at Stations 2, 3 and 4 are distortions of the tangent just ahead of the spiral and that the spiral should start at Station 4. Therefore, the computer enters zeros in Column 3 from the beginning to and including Station 4. He estimates the average ordinate beyond the spiral to be about 52, which, by Table No. 1*, represents a 4-deg. 6-min. curve. This curve, by the rules of his railroad, will require 4-in. elevation for the speed likely to be attained by trains on it. A spiral six stations long, 234 ft., will give a rise of 1 in. in 58½ ft., which is suitable for the speed expected, so the spiral rate will be 8 or more. The computer tries 8, 16, 24, 32, 40 and 48 opposite Stations 5 to 10, inclusive, and enters 52 at Station 11. As there is a difference of 4, or half the rate, between Stations 10 and 11, this means that the spiral will be 6½ stations long, or 253.5 ft., and the rate of run-off is 1 in. in 63.4 ft.

Has to Back Up

The computer then starts his computations as heretofore explained, and when he reaches Station 18 he finds that he is obtaining large errors in Columns 5 and 6, both positive, so there is no chance of them cancelling each other. Therefore, it is necessary for him to change his ordinates. He decides to increase the ordinates from the end of the spiral, so he backs up to Station 10 and copies the figures for that station in Columns 8 to 11, and enters 53 in Column 8 for Station 11. He computes the figures for the succeeding stations as before until he finds his errors becoming excessive again at Station 28. He then backs up again, but this time only to Station 22, as the work up to that point seems to be consistent. He copies the figures opposite Station 21 in Columns 3 to 6, having erased or crossed out those above Station 21 in these columns which he does not want to use. He then changes his ordinate to 54 at Station 22 and proceeds again. If his accumulated errors had been negative, he would have decreased his ordinates instead of increasing them.

Inspection of the measured ordinates ahead shows that the average value beyond Station 30 seems to be about 70, which will require an additional inch of elevation, so he inserts a two-station spiral by entering an ordinate of 62 at Station 29 and of 70 at Station 30, and proceeds with 70 as a trial ordinate. However, at Station 31 he has a zero in the sums column, which shows that all the original and revised ordinates to and including that station are balanced, so this is a good place to check on the remainder of the curve.

The exisiting spiral ordinates at the end of the curve show that the spiral is very short, so he decides to make this spiral six stations long, and uses a rate of 12, with 0 at Station 45. He then places 12, 24, 36, 48 and 60 opposite the proper stations. He adds all the ordinates beyond Station 31 and subtracts the sum of the spiral ordinates, and then divides the remainder by the number of ordinates not yet assigned values. The results, he finds, is almost exactly 70, so he continues to use 70 as a trial ordinate.

Completing his computation, he has an error of —1 in the sums column and an error of —4 in the half-

*See Part III, November issue, page 1157.

t Solutions Explained

This installment of the string-lining series goes into the solution of those types of curves, which, because of physical restrictions, are not susceptible of perfect solution. But, employing the same methods described and applied in earlier articles of this series, plus good judgment, the author shows by specific examples how they can be solved to a high degree of satisfaction. Special consideration is given the problem of making adjustments in revised curves to avoid encroachment on adjacent tracks.

throws column. To eliminate these it is merely necessary to reduce the revised ordinate by one unit at a point four stations from the end of the curve. The 60 at Station 40 is changed to 59 and the errors disappear. If there had been no error in the sums column and the error in the half-throws column had been —4, then it would have been necessary to choose any pair of ordinates, four stations apart, and reduce the one nearest the beginning of the curve by one unit and increase the other by one unit, and the work would have balanced out again. All columns must have a zero for a final value to be balanced.

The rule for eliminating the final error is as follows: *If the error is POSITIVE, ADD to the ordinate nearer the beginning of the curve and subtract from the ordinate nearer the end of the curve, making the number of stations between the changed ordinates the same as the value of the error. If NEGATIVE, SUBTRACT from the first and add to the later ordinate.*

Sometimes no single pair, or two pairs, in the same direction, will correct the error without distorting the alinement more than is desirable, but a pair farther apart in the proper direction may be used, over-correcting the error, and a pair not so far apart in the opposite direction may be found which will remove the excess correction. The stations selected for correction are indicated by plus and minus signs in Column 7, and the revised computations made on the opposite half of the slate. Care should be taken to select pairs which do not cause defects in the alinement, and frequently pairs may be selected which actually improve the alinement.

Now, the computer has a practically perfect curve figured, and a solution of the problem has been made. But, as there are many solutions possible, it is by no means certain that he has found the best solution; in fact, it is more than likely that his solution is not acceptable at all points. First, the curve involved is in the southbound track, so there is the possibility that some of the throws will make it encroach on the clearance from the northbound track. As it is a curve to the right, and other track is to the left of it, the outward, or positive, throws must be inspected to see if they will cause the track centers to become less than standard clearance (13 ft. on most railroads).

1	2	3	4	5	6	7	8	9	10	11	12
Sta. Nos.	Orig. Ords.	Rev. Ords.	Diff.	Sums Diff.	Half Throws		Rev. Ords.	Diff.	Sums Diff.	Half Throws	C. to C.
1	0	0	0	0	0						
2	2	0	2	2	0						13'-2"
3	2	0	2	4	2						
4	1	0	1	5	6	E-0					13'-4"
5	6	8	-2	3	11						
6	17	16	1	4	14						13'-6"
7	22	24	-2	2	18						
8	30	32	-2	0	20						13'-4"
9	38	40	-2	-2	20						
10	44	48	-4	-6	18	OK	48	-4	-6	18	13'-2"
11	53	53	1	-5	12		53	0	-6	12	
12	53	52	1	-4	7		53	0	-6	6	13'-0"
13	53	52	1	-3	3		53	0	-6	0	
14	55	52	3	0	0		53	2	-4	-6	13'-0"
15	61	52	9	9	0		53	8	4	-10	
16	49	52	-3	6	9		53	-4	0	-6	12'-11"
17	49	52	-3	3	15		53	-4	-4	-6	
18	58	52	6	9	18		53	5	1	-10	12'-10"
19	52						53	-1	0	-9	
20	55						53	2	2	-9	12'-11"
21	53	53	0	2	-7	OK	53	0	2	-7	
22	48	54	-6	-4	-5		53	-5	-3	-5	13'-0"
23	60	54	6	2	-9		53	7	4	-8	
24	58	54	4	6	-7		53	5	9	-4	13'-0"
25	47	54	-7	-1	-1		53	-6	3	5	
26	50	54	-4	-5	-2		53	-3	0	8	13'-1"
27	58	54	4	-1	-7		53	5	5	8	
28	60	54	6	5	-8	E-4"	53	7	12	13	13'-1½"
29	60	62	-2	3	-3						
30	72	70	2	5	0	E-5"					
31	65	70	-5	0	5						13'-2"
32	69	70	-1	-1	5						
33	72	70	2	1	4						13'-4"
34	73	70	3	4	5						
35	61	70	-9	-5	9						
36	78	70	8	3	4						13'-3"
37	74	70	4	7	7						
38	59	70	-11	-4	14						13'-5"
39	68	70	-2	-6	10	OK	70	-2	-6	10	
40	61	66	1	-5	4		59	2	-4	4	13'-2"
41	45	48	-3	-8	-1		48	-3	-7	0	
42	46	36	10	2	-9		36	10	3	-7	13'-1"
43	25	24	1	-7	-7		24	1	4	-4	
44	8	12	-4	-1	-4		12	-4	0	0	13'-0"
45	0	0	0			E-0	0	0	0	0	

Example No. 3—Computations for a compound curve having an intermediate spiral

Lean of Cars Considered

In this case, minus throws will increase the distance between tracks, so they need not be considered in this feature, but the minus throws will decrease the clearance from signals, station platforms or other obstructions to the right of the track. For these, not only the clearance at track level must be watched, but it must be remembered that the cars are leaning to the inside also and, at the average height of the car eaves, an additional amount of clearance is necessary. This amounts to approximately three times the elevation of the outer rail, so, with 5-in. elevation the center of the track must be about 15 in. farther from a vertical obstruction than would be necessary on straight track. As the cars on both tracks would be leaning to the same side, this need not be considered

when examining the effect on centers between tracks, unless one track is elevated more than the other.

Inspection of the outward throws at each station, in connection with the measured track centers, shows that the throw of 20 units at Stations 8 and 9 is too great. Twenty units in the half-throws column means 5 in. toward the other track where the centers are only 13 ft. 4 in. and 13 ft. 3 in., respectively, so the throws will have to be reduced at these stations or the other track will have to be adjusted at the same time. Usually it is undesirable to disturb the adjacent main track until such time as it is to be overhauled, so the computer proceeds to adjust his curve slightly to stay in the clear. (See Example No. 3-A.)

1	2	3	4	5	6	7	8	9	10	11	12	
Sta. Nos.	Orig. Ords.	Rev. Ords.	Diff.	Sums Diff.	Half Throws		Rev. Ords.	Diff.	Sums Diff.	Half Throws	Orig. C. to C.	Rev. C. to C.
1	0	0	0	0	0							
2	2	0	2	2	0						13'-2"	13'-2"
3	2	0	2	4	2	OK	0	2	4	2		
4	1	0	1	5	6	+	1	0	4	6	13'-4"	13'-2½"
5	6	8	-2	3	11	+	9	-3	1	10		
6	17	16	1	4	14		16	1	2	11	13'-6"	13'-3¼"
7	22	24	-2	2	18		24	-2	0	13		
8	30	32	-2	0	20		32	-2	-2	13	13'-4"	13'-0¾"
9	38	40	-2	-2	20		40	-2	-4	11		
10	44	48	-4	-6	18		48	-4	-8	7	13'-2"	13'-0¼"
11	53	53	0	-6	12	-	52	1	-7	-1		
12	53	"	0	-6	6	-	"	1	-6	-8	13'-0"	13'-2"
13	53	"	0	-6	0	-	"	1	-5	-14		
14	55	"	2	-4	-6	-	52	3	-2	-19	13'-0"	13'-4¾"
15	61	"	8	4	-10		53	8	6	-21		
16	49	"	-4	0	-6		"	-4	2	-15	12'-11"	13'-2¾"
17	49	"	-4	-4	-6		"	-4	-2	-13		
18	58	"	5	1	-10		"	5	3	-15	12'-10"	13'-1¾"
19	52	"	-1	0	-9		53	-1	2	-12		
20	55	"	2	2	-9	+	54	1	3	-10	12'-11"	13'-1½"
21	53	53	0	2	-7	+	54	-1	2	-7		
22	48	54	-6	-4	-5	OK	54	-6	-4	-5	13'-0"	13'-1¾"
(Balance same as example No. 3)												

Example No. 3A—Showing adjustments made to keep revised curve clear of adjacent track

Reducing Positive Throws

In order to reduce the positive throws at any station, the revised ordinate at one or more stations, somewhere ahead, that is, toward the start of the curve, must be increased by a unit each. In this case, however, the throws to be reduced are on the spiral, so the correction must be made in the spiral itself. Remembering that the first term of a perfect spiral had a value of 1/6 of the rate of the spiral, it will be perfectly proper to increase the zero at Station 4 to a value of 1. However, a trial using this value will show that it is not sufficient, so the 8 at Station 5 is increased to 9, leaving the balance of the spiral as it is to Station 10. Stations 11 and 12 are reduced one unit each, which brings the sum of the error column back to the same values as in the original solution, but now there is an error, or out of balance, of 14 units in the half-throws column. This is caused by two pairs of ordinates, seven stations apart, having been changed.

To reduce this error it is necessary to choose two more pairs of ordinates, seven stations apart (or one pair 14 stations apart, or any other combination which will balance the 14-unit discrepancy), where a change in the opposite direction may be made, that is, with the reduced ordinates ahead of the increased ordinates. Statons 13 and 14 are chosen in this case because ordinates of the same value are kept adjacent, and the increased ordinates fall at Stations 20 and 21, where their new value is the same as those at the succeeding stations. Ordinates for these corrections should be selected with an eye toward keeping the alinement as good as in the previous solution, and to better it if possible. In this case the change at Station 11 reduces the length of the spiral to 6½ stations, as originally planned, instead of the 6⅝ stations which it had become.

Good Alinement Maintained

There is a flattening of the regular curve of one point each for four stations at the end of the spiral, and there is one station on the spiral where the rate of increase is 7 instead of 8, but aside from these the curve is in as good alinement as before the correction was made. Often, by choosing the proper stations, the corrections can be so placed that the alinement is improved with each new solution. Often an hour or two spent in trying various corrections will be well repaid in improved alinement, particularly when there are several places where slight changes in the line must be made to clear side obstructions, or to pass over the centers of bridges or to meet other fixed conditions.

Most Important Point

The writer frequently has obtained a balanced solution in half an hour and then spent five or six hours in improving it so as to fit all conditions. This feature of the work of string lining is its most important point, and is the part about which the least is said in most instruction books. This is the work which must be done in quiet surroundings, where the computer can concentrate on what he is trying to accomplish and follow out each trial solution to see that it does not throw his curve out of position at some other point where it is undesirable.

When the computer is satisfied that he has found the best solution, he copies the final revised ordinates opposite the proper stations in his original record book, and re-figures the curve throughout as a final check. If his work is correct, he will have a zero at the bottom of each column and the throws at each station will be the same as those on his work sheet.

The Best Solution

The best solution is one which is most uniform (with no change of the curve ordinates of more than one unit of value from adjacent ordinates, and no change of the spiral ordinates greater than one unit from the average rate of increase or decrease), which passes by all obstacles with the required clearance and through all fixed points as desired. If this is not possible, obstructions must be moved or adjusted prior to lining the track.

The stakes showing the new alinement should be set as soon as possible after the work is computed so they will be placed to correct the irregularities in the original alinement. If too much time is allowed to elapse, the track alinement may be changed by traffic and temperature variations so that the figured throws no longer give a true curve to the stakes. Of course, prior to setting the stakes, no work should be done which affects the alinement of the track, or the entire computation will be worthless and must be done over from the start.

Two Flame-Cleaning Jobs— A Study of Costs

Two identical truss bridges were flame-cleaned on the Southern, one during extremely hot weather and the other in cool weather. A comparison of the results revealed that the latter project was carried out at a considerably lower cost per square foot than the former. The reasons for the variation in costs, and other pertinent information concerning the work are given in this article.

The Southern's Tuscumbia river bridge, shown here, and Cypress creek bridge are identical

Operation of the flame-cleaning torches . . .

AN INTERESTING comparison in the cost of flame-cleaning was made possible when the Southern applied this process to two identical bridges, one of which, across Cypress creek, was cleaned in November and December, 1946, while the work on the other, spanning the Tuscumbia river, was done in July and August, 1947. Hence, since one job was carried out in cool weather and the other in extremely hot weather, it was possible to make a direct comparison of the results obtained under widely-varying weather conditions.

Both of the bridges involved in this work are located on the Memphis division of the road, one carrying the line across Cypress creek at Cypress, Tenn., while the other spans the Tuscumbia river near Pocohontas, Tenn. These are identical single-track, single-span, through-truss bridges, with lengths of 158 ft. 3 in. Each of them has 18,450 sq. ft. of exposed surface, including some 54,000 rivet heads.

The equipment and organization employed in cleaning these two bridges were substantially similar in each case. Every inch of exposed surface was flame-cleaned on each of them, using Airco Style 9803 torches and Style 110 round tips, the reasoning being that tips of this type were best suited for use on this job because of the lattice construction of some of the members. Two torch outfits were used on both bridges, with each out-

. . . was followed closely by wire brushing

. . . and painting while steel was still warm

fit involving five cylinders of oxygen with manifold and three cylinders of acetylene with manifold.

The crew doing the work in each case consisted of one of the railroad's regular bridge and building gangs. The personnel of a gang consisted of two torch operators, four men operating power wire brushes, two men using hand wire brushes, one painter applying the primer coat, a foreman and a cook. When more than nine productive men were used on a gang, an assistant foreman was also added.

Flame Cleaning and Prime-Coat Painting Cypress Creek and Tuscumbia River Bridges—Comparative Labor and Materials Costs*
18,450 sq. ft. of surface cleaned each bridge

	Cypress Creek				Tuscumbia River			
	Unit	Unit price	Cost	Cost per sq. ft.	Unit	Unit Price	Cost	Cost per sq. ft.
Flame cleaning								
Operation of torches	450.25 man-hr.	1.512	$ 680.78		818 man-hr.	1.60	$ 1,308.80	
Gases	107.167 cu. ft.	.0098	1,051.27		105,493 cu. ft.	.0101	1,073.95	
Scaffolding	46.87 man-hr.	1.512	70.87		80 man-hr.	1.60	128.00	
Labor and material for flame cleaning			$1,802.92	$.0977			$2,510.75	$.1361
Wire brushing								
Brushing	1,230.5 man-hr.	1.512	1,860.52		1,491 man-hr.	1.60	2,385.60	
Scaffolding	46.87 man-hr.	1.512	70.87		80 man-hr.	1.60	128.00	
Cost of brushing			$1,931.39	$.1047			$2,513.60	$.1362
Cost of preparing surfaces			$3,734.31	$.2024			$5,024.35	$.2723
Applying primer paint coat								
Scaffolding	93.75 man-hr.	1.512	141.75		160 man-hr.	1.60	256.00	
Paint — Red lead	69 gal.	1.80	124.20		67 gal.	2.16	144.72	
Paint — Zinc Chromate					364 man-hr.	1.60	582.40	
Applying paint	375 man-hr.	1.512	567.00					
Labor and material applying primer			$ 832.95	$.0451			$ 983.12	$.0533
Miscellaneous**								
Materials			4.65				$ 6.50	
Labor	647.75 man-hr.	1.237	801.27		464.5 man-hr.	1.26	585.27	
Miscellaneous cost			$ 805.92	$.0437			$ 591.77	$.0321
Cost of cleaning and applying primer coat of paint			$5,373.18	$.2912			$6,599.24	$.3577

* The cost figures in this table are based on current wage rates. They do not include items showing the cost of maintaining equipment used, overhead charges for this equipment, or engineering supervision.

** Includes cost of handling oxygen and acetylene tanks, mixing paints, initial travel to job, handling water for fire protection, gasoline and oil required for running compressor, and other small items

Sequence of Operations

The procedure followed in cleaning these bridges was to work from the top down on each section so that the brush operators would be above the torches, out of the way of any falling hot scale. The operation of the flame-cleaning torches was followed as closely as possible by the wire brushing, and the primer coat application followed closely behind the wire brushing while the steel was still warm and dry. On Cypress creek bridge, red lead was used for the primer coat, and on the Tuscumbia River bridge, a zinc chromate primer was used.

The comparative results obtained on the two projects are given in the accompanying table in which the figures giving labor costs are based on current wage rates. The figures in this table will be more readily understandable if brief consideration is given first to the action that takes place when a metal surface is cleaned by the oxy-acetylene flame. When the heat of the flame is brought into contact with a surface covered with rust and scale, this latter material, being present in a much thinner layer than the bridge member it covers is quickly heated and expands more rapidly than the underlying surface, thereby breaking its bond with the parent metal. At the same time the heat of the flame is transforming the moisture underneath the scale into steam, and the result is a minor "explosion" that adds the impetus needed to pop the rust and scale off, carrying with it the charred paint pigment and other dirt that has become trapped on the surface.

Results Compared

It will be noted from the table that the cost of cleaning and painting the Cypress Creek bridge, on which the work was performed in cool weather, ran a few cents lower per square foot than that for the Tuscumbia river bridge, where the work was done in extremely hot weather. The chief reason given for this was the fact that, when such work is done in cool weather, full advantage is taken of the quick expansion of the scales on the cool steel members, while in hot weather both the scale and the steel members are already in a partly expanded condition.

At the time the work was done on the Tuscumbia River bridge thermometers placed in the sun on the members registered as high as 146 deg. F. In the presence of this extreme temperature it was reported that all surface condensation was evaporated, so that the steel surface was dehydrated before contact was made by the flame, thus depriving the operation of the impetus afforded by the "explosion," and also the full temperature differential between the heated scale and the underlying surface. The result was that the operations were slowed down considerably.

On both of these jobs the wire brushing work was done only partially by power-driven equipment—about 50 per cent at Cypress Creek and 85 to 90 per cent at the Tuscumbia river. At Tuscumbia excessive heat lowered the efficiency of the workers. On the Cypress Creek job, it may be estimated that the maximum use of power brushes would have had the effect of reducing the 1230½ man-hours required for wire-brushing about 60 per cent and that the cost of this work would have been reduced a corresponding percentage.

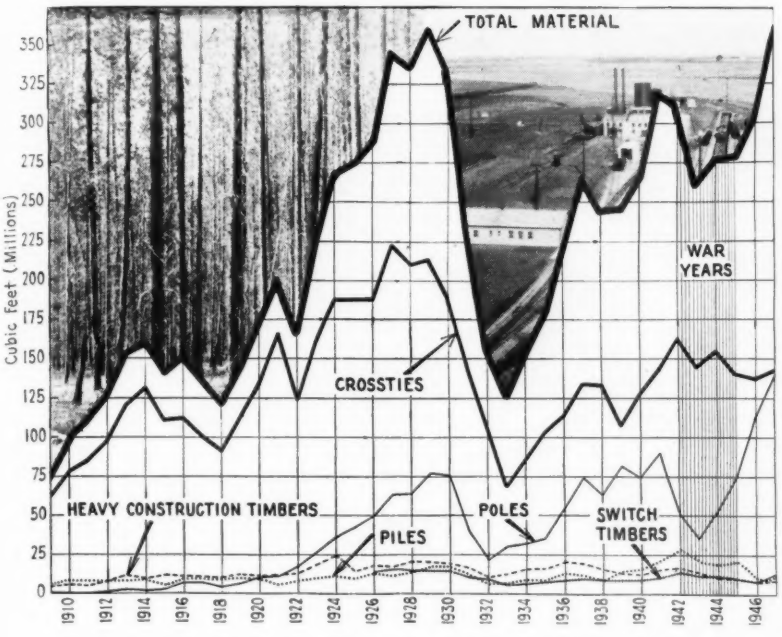


Chart showing the amount of wood treated in various categories since 1909

The wood-preserving industry treated 356,587,809 cu. ft. of wood in 1947, according to the annual report compiled by Henry B. Steer, Forest service, United States Department of Agriculture, in cooperation with the American Wood Preservers' Association. This was about 16 per cent greater than the amount treated in 1946, and has been exceeded only once before—in 1929 when 362,009,027 cu. ft. was processed.

Wood Preservation Nearly Hits Record in 1947

CROSSTIES—47,942,452 of them—continued in 1947 to be the largest class of material given preservative treatment. Not since 1909, when records of wood preservation were started, has any category of treated material threatened the first-place ranking held by crossties until the last several years. However, the number of poles treated annually began to climb sharply in 1943 and this movement has continued until, in 1947, a total of 8,096,613 poles was treated, an all-time high. This number was equivalent to 142,500,389 cu. ft., which was only slightly below the 143,827,356 cu. ft. of ties treated in that year.

In 1947 approximately 55 per cent of all crossties were treated with creosote or creosote-coal-tar solution, and about 43 per cent with creosote-petroleum solutions. These figures represent a decrease of 5 per cent in the quantity treated with creosote and an increase of 7 per cent in the quantity treated with creosote-petroleum mixtures. Again, as in 1946, oak and southern pine ties predominated. In doing so, however, oak ties retained approximately their same percentage of the total as in 1946, but southern pine ties dropped from 28 per cent to 18 per cent in retaining second place.

The treatment of switch ties in 1947 followed closely the pattern established by crossties, except that the total amount of 11,586,236 cu. ft. represented an increase over 1946 of 54 per cent. The quantity of switch timber treated with creosote or creosote-coal-tar solution was 7 per cent less than the amount treated in 1946, while the amount treated with creosote-petroleum mixtures increased by a similar percentage.

The quantity of wood given fire-retardant treatment in 1947 was 13 per cent more than in 1946. This increase arrested a steady decline which had been in progress since 1943. The principal chemicals used in providing this treatment were chromated zinc chloride, Protexol, and Minalith.

The shortage of creosote which has plagued the wood-preserving industry for the last several years continued into the early part of 1947. However, it resolved itself in time for the total amount of creosote used to reach a figure 25 per cent above that used in 1946. There was not only a small increase in the amount of domestic distillate coal-tar creosote used, but a very large increase in the amount of imported distillate coal-tar creosote.

During 1947 the wood-preserving plants reported a consumption of 82,948,095 gal. of creosote-petroleum solution—an increase of 10,602,972 gal. over the amount reported for 1946. This total includes 434,288 gal. of creosote coal-tar solution. Although it was reported in 1946 that the use of pentachlorophenol and copper-naphthenate were used for the first time only because of the shortage of creosote, these salts continued to increase in use during 1947 in spite of the increased availability of creosote. While all other preservatives were increasing in use during 1947, the amount of zinc chloride, Wolman salts, and Celcure decreased slightly.

Crossties Treated by Kind of Wood and Preservative—1947

(Quantity—number of ties)

Kind of wood	Creosote[1]	Creosote[2] petroleum	Creosote petroleum copper naphthenate	Zinc chloride	Miscellaneous[3] preservatives	Total	Per cent of total
Oak	11,474,791	5,518,178	192,234	29,652	27,441	17,242,296	36
Southern pine	5,549,078	2,790,912	180,633	111,047	35,806	8,667,476	18
Gum	2,545,424	1,629,911	22	14,961	.....	4,190,318	9
Douglas fir	69,207	4,164,844	1,487	.....	28,451	4,263,989	9
Beech	7,937	.....	.....	.....	.....	7,937	1
Maple	.....	68,358	.....	.....	.....	68,358	1
Larch-tamarack	730,085	.....	.....	.....	.....	730,085	2
Birch	3,001	36,474	.....	.....	.....	39,475	1
Lodgepole pine	.....	481,746	.....	.....	.....	481,746	1
Ponderosa pine	6,066	742,579	5,214	156,231	.....	910,090	2
Hemlock	3,023	141,287	.....	.....	.....	144,310	1
Elm	.....	22,337	.....	.....	.....	22,337	1
All other	6,645,009	4,275,326	152,115	.....	101,585	11,174,035	23
Total	26,303,536	20,602,037	531,705	311,891	193,283	47,942,452	
Per cent of total	55	43	1	1	4		100

[1]Includes distillate coal-tar creosote and solutions of creosote and coal tar.
[2]Includes various-percentage solutions of creosote and petroleum.
[3]Includes solutions of petroleum pentachlorophenol and creosote petroleum pentachlorophenol, chromated zinc chloride, and Wolman salts.

Servicing a N.P. passenger Diesel on a cold day. In such weather the results of boiler failure due to poor water can be serious

Solving the D

WHEN the decision was made by the Northern Pacific to use Diesel power on its transcontinental passenger trains, this road, as have other roads in the same situation, was presented with new water-treating problems which were inherently different from those encountered in steam locomotive operations. The steam generators provided on Diesel passenger locomotives to produce steam for heating or cooling the trains require specially-treated water if trouble-free operation is to be maintained. Water treated for steam locomotives is not entirely suitable; consequently, none of the existing water supplies, as such, could be used. Furthermore, there were special problems to be solved which were peculiar to the climate, and to the nature of raw water supplies in the territory through which the passenger trains operate.

Cold Weather Country

The Northern Pacific operates from St. Paul, Minn., to Portland, Ore., and Seattle, Wash., through the states of North Dakota and Montana where, in the winter, extended periods of extremely cold weather are common. Generally speaking, the water throughout this cold-weather territory is of poor quality, containing a high percentage of the dissolved solids that are detrimental to the proper operation of the steam generators.

Since the comfort of passengers is such a highly important consideration, steam failures due to improper treatment or insufficient water cannot be tolerated. Although calculated costs reveal that steam-coil replacement is often cheaper than properly treating water to prevent the need for such replacement, it is so important to eliminate complete failures, especially in cold weather, that the costs of special treatment must, to some extent, be disregarded.

After taking into consideration all the foregoing factors, the Northern Pacific decided to treat the water supplies for use in the steam generators to provide the lowest possible amount of hardness and dissolved solids that it would be possible to obtain, and then to improve it further by an additive treatment designed to protect the generator coils against low and high-temperature corrosion due to oxygen or other gases.

Baggage Car Tanks

Studies showed that the amount of water necessary to heat a 17-car train in extremely cold weather could not, with assurance, be carried in the locomotive tanks alone. Consequently, it was decided to install in the baggage car of each train two 1,500-gal. auxiliary tanks, along with a pump.

Knowing the amount of water that could be carried and the volume required, it was possible to locate the watering stations at points where properly treated water could be delivered or where the natural water was suitable without softening. One of these points is St. Paul, Minn., where the locomotive tanks are filled at the enginehouse and the baggage car tanks at the coach yard. Other points of supply are Fargo, N.D., Glendive, Livingston and Missoula, Mont., and Pasco and Seattle, Wash.

The plants at the St. Paul roundhouse, and Fargo, Livingston and Pasco are all of the same type. The water is treated with carbonaceous zeolite, regenerated with sulfuric acid. The effluent is deaerated, neutralized with caustic soda and post-treated with a blend of alkali poly-phosphate and specially processed organic material which has high oxygen absorptive properties. The post-treatment gives excellent protection against both scale formation and corrosion. The protection afforded makes it unnecessary to install deaerating equipment in the locomotives to minimize corrosion. Typical field analyses in grains per gallon of the waters at these locations are shown in Table I.

At the St. Paul coach yard the baggage car tanks are filled with sodium-zeolite-treated water which has been post-treated with organic compounds and phosphate for corrosion prevention and protection against the slight hardness that leaks through. A typical field analysis of this water before and after treatment is as follows:

	Before	After
Total hardness	2.9	0.0
Calcium hardness	1.7	0.0
Phenolphthalein alk.	Trace	Trace
Methyl orange alk.	2.3	2.4
Chlorides as NaCl	0.8	0.8
Sulfates as Na_2SO_4	2.1	2.1
Silica as SiO_2	1.1	1.2
Total Dissolved solids	6.0	7.0

Diesel Water Problem On a Northern Line

With the inauguration of Diesel locomotives on its transcontinental passenger trains, the Northern Pacific was faced with the problem of providing facilities for delivery of properly treated water for the Diesel's steam generators along a route having extreme weather conditions and raw waters of a poor quality. This article tells how the problem was solved, and gives details of the treating methods developed and the facilities constructed.

Table I—Typical Analyses of Water (Grains per Gallon) at Four Locations, Before and After Treatment

	St. Paul		Fargo		Livingston		Pasco	
	Before	After	Before	After	Before	After	Before	After
Total hardness	17.2	0.1	8.0	0.2	6.2	0.0	3.7	0.0
Calcium hardness	9.6		3.6		3.7		2.7	
Phenolphthalein alk.	0.0	0.7	1.0	0.7	0.0	0.5	0.0	0.3
Methyl orange alk.	14.0	2.7	5.9	1.8	6.0	2.6	3.5	2.7
Chlorides as NaCl	1.2	1.1	1.2	1.1	0.9	0.9	0.4	0.4
Sulfates as Na_2SO_4	3.2	3.45	2.6	2.7	3.1	3.2	0.6	0.6
Silica as SiO_2	1.25	1.25	*	*	1.1	1.1	0.6	0.6
Total dissolved solids	19.0	8.5	11.0	6.0	11.0	7.0	5.0	4.0

At Missoula and Seattle the raw waters are very soft and at the present time are used without chemical softening. The wayside method of treatment is used, adding enough phosphate and alkalinity to react with the slight hardness and to produce an excess alkalinity of 40 per cent. Processed organic material is used for protection against corrosion. Typical field analyses of these waters before and after treatment are shown in Table II.

The lime-soda treated water at Glendive, Mont., has total dissolved solids of 40-50 grains at the period of greatest demand. The condensate from the depot building is filtered through coal, for oil removal, and stored in a basement tank, the lime-soda water only being used to make up the deficiency in condensate supply. These are both post treated to 40 per cent excess alkalinity with special treatment.

The treating plants at Pasco, Fargo and Livingston are Permutit systems consisting of Zeo-Karb softeners, decarbonization tanks and storage tanks, along with the necessary chemical tanks, acid pots, pumps and piping. At Pasco the treating facilities are located in the depot, at Fargo in the depot basement, and at Livingston in a separate building specially constructed for the purpose. The valve pits at the various points are located at the ends of the station platform and are spaced in such a way that, when a Diesel has stopped, only a 25-ft. length of 2½-in. fire hose at each hydrant is necessary to water it.

Lubricated plug cocks are used in the pits and at these cocks there are drain holes which serve to drain the piping and hose after servicing. The ends of the hose have standard snap-on fittings which have worked out quite satisfactorily. The pits are not heated, but since the lines are drained above the plug cock a creosoted plank deck gives ample frost protection.

The facilities have watering capacities of 400 to 600 g.p.m. The storage tanks have capacities large enough to allow ample time for regeneration of the softeners by employees working only part time.

Table II—Typical Analyses of Water (Grains per Gallon) at Seattle and Missoula Before and After Treatment

	Seattle		Missoula	
	Before	After	Before	After
Total hardness	1.4	1.4	0.9	0.9
Calcium hardness	0.6	0.6	0.5	0.5
Phenolphthalein alk.	0.0	0.4	0.0	0.5
Methyl Orange alk.	1.2	3.0	1.0	2.4
Chlorides as NaCl	0.7	0.7	0.2	0.2
Sulfates as Na_2SO_4	0.0	0.0	0.2	0.2
Silica	0.48	0.48	0.55	0.55
Phosphate as PO_4		not run		not run
Total dissolved solids*	2.5	6.0	1.5	4.5

*Nalcometer

Engine cooling water for the Diesels is supplied at the various terminals where the locomotives are serviced. At terminals where the raw water is low in hardness and dissolved solids, the raw water is used. Otherwise distilled water or condensate from power plant boilers is used. All cooling water is treated with chromate-type inhibitors and is tested frequently enough to maintain the desired inhibitor concentration. When the concentration is found to be too low, the enginehouse employees add the necessary amount of powder to bring it up to the proper strength as determined by tables which have been developed for the various cooling system capacities.

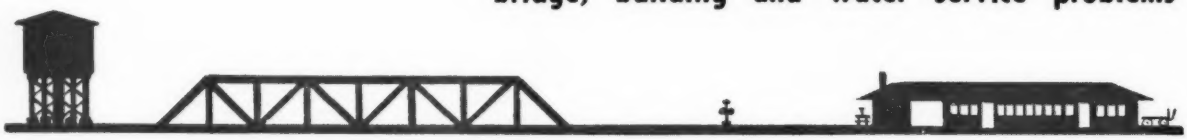
When condensed steam from a power plant is used for cooling water or boiler feed water, the condensate is filtered to remove the residual oil that distills from the boiler with the steam. The Northern Pacific has found that the semi-bituminous coal taken from its mine in southern Montana is a very effective filtering medium. It is crushed and screened, but only that part between 8-mesh and 40-mesh screens in size is used. Supported on graded anthracite in a standard filter, this material removes all the residual oil. When cleaning is necessary, the bed is steamed and backwashed with water. Since the material is cheap and easily replaced, the bed is renewed each year.

The results that are being obtained indicate that a material improvement has been made in steam generator coil life. To date, most of the coils are 18 months old and the maximum tube life is still undetermined. Incrustation in the small piping is at a minimum and no incrustation is being experienced with the pot screens.

The Northern Pacific's Diesel watering facilities were designed and constructed under the general direction of Bernard Blum, chief engineer, assisted by H. M. Schudlich, engineer of water service, to whom we are indebted for the information contained in this article.

WHAT'S THE ANSWER?

An open forum for maintenance men on track, bridge, building and water service problems



Removing Little-Used Crossovers

How important is it to remove unnecessary or little-used crossovers or turnouts from main tracks? How many man-hours of maintenance labor can be saved annually through the elimination of each such unit. Are there other advantages to be derived? Explain.

Savings Justify Removal

By E. M. UNZICKER
Division Engineer, Gulf, Mobile & Ohio, Bloomington, Ill.

A totally-unused or seldom-used turnout or crossover in the main line of a railroad is a white elephant. However, much as good maintenance men try to eliminate them, enough pressure, from one source or another, is often exerted so that some such turnouts and crossovers must be kept here and there, in serviceable condition, year after year.

No doubt there are sometimes good reasons, not known to us, for wanting to hold such unused facilities in readiness for future use. However, if we do our job well, we should continually recommend their elimination to the management if it can be shown that abandonment is justified.

Justification resolves itself into nothing more than a question of operating and maintenance expenses. Our inability to prove our case results from the fact that we do not advertise sufficiently to other departments what an unused track function really costs, or what additional hazard its continued use presents to safe operation.

It may be rather bold of me to set up any exact figures, since all of us, as engineers, have hard and fast ideas or conclusions of our own, but I submit the following items, based on facts and experience, and each reader can analyze, add, subtract or change them to suit his own taste.

Consider, for example, only a main-line No. 10 turnout, not interlocked, in double track, of average weight rail, with average traffic for a Class I railroad. A crossover will about double any facts or figures. If the turnout is a facing point, slight increases for locking devices, etc., obtain. If interlocked, figures go much higher.

There are three main things to consider in this problem: (1) First cost, or investment; (2) fixed charges and maintenance; and (3) potential hazards involved.

In considering item No. 1, we find that initial installation ordinarily calls for the use of new material. For a common main line turnout, this represents an investment of approximately $1,800. If never or only little used, the turnout cost finally becomes a loss. The quicker a function can be retired, therefore, the higher salvage value it will have to be credited against such loss.

In item 2, we find: that fixed charges, including interest on investment, some depreciation, and perhaps a whisker of taxes, are minor; and maintenance costs are major. Maintenance costs include inspection by a track supervisor, roadmaster, signal maintainer, track foreman, and others. The switch must be cleaned and oiled about once each week. If a lip develops on the switch point, it must be ground off. Perhaps the frog has to be built up by welders. Each time a switch point, stock rail and/or frog wears out and needs replacement with

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Answers to the following questions are solicited from readers. They should be addressed to the What's the Answer editor, *Railway Engineering and Maintenance*, 105 W. Adams St., Chicago 3, and reach him at least 30 days in advance of the issue in which they are to appear. An honorarium will be given for each published answer on the basis of its substance and length. Answers will appear with or without the name and title of the author, as may be requested. The editor will also welcome any questions which you may wish to have discussed.

To Be Answered In the February Issue

1. *In double or multiple-track territory where conditions permit killing one track to allow major track maintenance operations without the interference of traffic, is it feasible to install temporary crossovers at intervals to facilitate the detouring of trains? If so, should crossover ties be left in track after work in a specific territory has been completed? Explain.*

2. *To what extent is it desirable to permit or encourage local Chambers of Commerce or other civic organizations to erect large signs on railroad property to supplement station signs in identifying towns for the traveling public? Are there disadvantages?*

3. *In checking the riding quality of his track, should the supervisor or roadmaster ride the rear end of conventional equipment, the fastest streamliners, or both? To what extent should he ride locomotives—steam and Diesel? Explain.*

4. *When bridges are threatened by high water, should they be loaded with cars of cinders, sand or coal, as may be available? Does the type of bridge make any difference? What is the effect of such loading?*

5. *How extensive is the use of switch heaters on your road? What types are used? How effective have they been in meeting severe storm conditions, offsetting labor shortages, and reducing switch cleaning costs? Explain.*

6. *What are wetting agents? For what railway purposes are they adapted? How effective are they? Explain.*

7. *To what extent and for what purposes can highway truck cranes be used by the bridges and building forces? What capacities are best adapted? Cite examples of use.*

a new one, welders must build up the matching rail ends. Frequent adjustment for expansion must be made in switches, wing rail of frog, etc. Turnouts require more surfacing than ordinary track on account of the poorer drainage conditions in their wider roadbeds. Many other minor items of maintenance expense, too numerous to mention, round out the cost, which totals yearly about $430.

These expenses, of course, are common to all turnouts, but if the unused one were removed its expenses would stop. If the need of a turnout is debatable, one can figure that a year's safe maintenance cost saved would more than pay for its removal and re-installation a year later if necessary. If actual abandonment cannot be justified, the rail, switch and frog can be removed and stored nearby, and the main track closed with a straight rail. When needed the switch could be restored at only a fraction of the yearly maintenance cost.

Under item 3, there are, at every turnout, potential hazards for personnel and equipment. Any fewer turnouts reduces the degree of that potential. The reputation that the railroads have of being the safest means of transportation has been established only through adoption of strict rules of safety in operation and in all other practices. Holding the number of turnouts to a minimum is good practice. Accidents attributable to turnouts may be rare and unusual, but when they occur they are often serious and costly.

On ordinary track a burned-off journal may not be too serious because equipment will remain in line on the ties, but derailments that otherwise would be minor with a pair of wheels running across good ties, may become major when derailed equipment passes through a turnout. If this happens to be an unnecessary turnout, the major derailment is unnecessary.

From a study of these facts it is apparent that it is somewhat vital from a safety standpoint, and very important from a cost standpoint, to remove unnecessary or little-used turnouts or crossovers from our main tracks wherever possible.

Good Reasons To Remove

By L. L. Adams
Assistant Chief Engineer, Louisville & Nashville, Louisville, Ky.

Conditions and operating requirements are continuously changing on the railroad and often certain tracks or other facilities that might have been necessary a few years ago are not needed at the present time. Everyone connected with the railroad should be continually alert to call attention to such unneeded facilities. Such unproductive facilities can be retired, effecting a saving in labor, material and their maintenance.

The above often applies to crossovers and turnouts in main tracks. As business conditions change, tracks and crossovers that were required at the time they were constructed may no longer be needed and should be removed as promptly as possible, for at least two good reasons: (1) It will require an average of possibly 320 man-hours of labor annually to maintain a crossover, the cost of material varying with traffic over the main line; and (2) when crossovers are not used extensively, they are only worn out by main-line traffic. Furthermore, there is always a potential danger in main-line turnouts, especially those with facing points. Therefore, their number should be reduced to the minimum. Their removal will also improve the riding condition of tracks, especially where such turnouts might be located on curves.

Building Driveways on Right-of-Way

Is it practicable to build driveways on the right-of-way to afford access to any point by trucks, tractors or other such equipment? Explain.

Roads Are Practicable

By H. W. Kellogg
Division Engineer, Chesapeake & Ohio, Pere Marquette District, Detroit, Mich.

On the portion of my division between Detroit, Mich., and Grand Rapids, our section crews and signal maintainers are all equipped with motor trucks, and the use of motor cars is limited to emergencies and the needs of track patrolmen. For this reason we have investigated the question of driveways on the right-of-way for operation of these vehicles, and have reached the following conclusions:

The degree of efficiency with which motor trucks can be used by regular section forces in maintenance work is governed by how close the trucks can be driven to the points where the work is being performed. It is needless to say that if trackmen were required to walk and carry their tools any great distance from their truck to the place where work is to be done, the value derived from the use of the truck has been lost in time consumed. Therefore, before adopting the use of motor trucks on a given territory to replace motor cars, a thorough study should be made as to whether the trucks could reach the track easily by means of parallel highways, cross roads, and farm lanes. If these conditions are favorable, the problem of whether the right-of-way between the points of access could be leveled off to permit the operation of trucks, should be studied.

The expense involved would not permit the construction of a highway on the right-of-way, similar to a modern road. However, a very satisfactory roadway can be had using a bulldozer and a small carry-all scraper. This equipment may be used to take dirt from the cuts to widen the smaller fills so that a truck and other off-track equipment can be operated adjacent to the track. Over flat country where the cuts and fills are very small, the right-of-way can be leveled easily with a bulldozer to permit the operation of motor vehicles. Such a roadway may be improved a great deal by unloading cinders with dump trucks, or from cars by means of a work train and a clamshell bucket. Locations where the cinders would be needed most could be selected and a few such places could be taken care of each year.

This type of roadway can be used very successfully during dry seasons, but during the spring of the year is likely to become impassable. However, notwithstanding the disadvantages that arise during rainy weather and spring thaws, it is possible to maintain useful roads at low cost during the major portion of the year. The construction of such roads can be extended over a long period of time and can be made a part of the maintenance program.

Makes Roads With Dozers

By C. R. Woodley
Roadmaster, Chicago & Illinois Midland, Springfield, Ill.

Providing a driveway on the right-of-way is not only practicable but necessary if the railroad is using trucks and tractor-mowers. However, there are many places on a right-of-way that need leveling before tractors can be moved over them.

I do all my work as a roadmaster traveling in a jeep. Some of our section crews have trucks, and our car department has both jeeps and trucks to carry out their work along the track, such as re-brassing hot boxes and clearing derailments. This equipment has proved to be economical of time and money, mostly because traveling by motor car is so frequently interrupted by train delays, which slow up the work. By using trucks for transportation these delays are eliminated.

We have a wide right-of-way along most of our main track which, in some places, is very rough. Much of this right-of-way has been leveled down with bulldozers. In other places we have widened the shoulder to provide a roadway. As a result, we can mow all of our right-of-way with tractors and can travel over a large part of it in trucks. We have just started to improve our driveways, but it will take some time to complete this work. We do not intend to make first-class roads of them; just good enough to travel on.

In this work we are leveling down rough spots and covering with cinders the places where the soil is damp and soft. Where ditches run across the right-of-way from culverts, we are extending the culverts and building a road over them good enough for us to travel on, but not good enough to tempt the public to use it.

Not All Terrain Suitable

By Track Foreman

Not all railroads run through terrain which is suitable for making driveways, or roads, adjacent to the track. To build such driveways through hilly, rocky, or mountainous territory would cost too much to make it worthwhile. Swampy ground would also present problems too difficult to overcome cheaply.

However, in territories where the land is rolling, where cuts are wide and fills are shallow, driveways can be constructed cheaply enough to realize large savings in money, and perhaps in lives. Present-day construction equipment is lowering the cost of building such roads; and the mobile tractors, cranes, trucks, air compressors, etc., now available to the railroads are making the use of those roads more profitable.

Where roads are not built, the use of motor cars results in much loss of time while waiting for trains. The use of trucks on highways and driveways eliminates these delays and thereby saves money. Even with seemingly endless instructions on how motor cars should be operated safely, many still collide with trains. Each collision probably means serious injury to at least one employee. Trucks on driveways, where feasible, will prevent such injuries and perhaps save lives.

The savings in money and lives alone are worth every effort that can be put forth to provide wider shoulders on fills, and adjacent driveways elsewhere. Additional economies are possible with the use of off-track tractor mowers, compressors, etc. With such savings possible under some conditions, all territories should be studied to determine the practicability of providing driveways for the effective use of mechanized equipment.

Extending a Snow Broom's Life

What constitutes a good snow broom? Can anything be done to prolong its service life? Explain.

Best Brooms Made of Fiber

By John B. Bell
Engineer of Track, New York, New Haven & Hartford, Providence, R. I.

Last winter we used approximately 19,200 brooms during and after snowstorms. It was necessary, in some instances, to take any kind of a broom. However, over a period of years, I have found that the ordinary corn broom does not stand up, and in some storms does not last a full work day. A broom made of fiber and rattan makes a good sturdy broom and will outlast three corn brooms. In my opinion the best broom is the 100 per cent fiber broom. This type of broom will hold its shape and last longer than any other type.

More damage is done to brooms because of abuse than usage. Webster's dictionary defines a broom as a "besom or brush." If the man using brooms would try to brush from switches only the loose snow and not the frozen snow and ice, the brooms would not break apart.

The proper way to treat a broom is to soak the bristles in water for an hour or more before using. However, this would not do during a snowstorm as the ice which would form in the bristles would damage them. We can, however, help in this respect by not storing the brooms in a place heated to the point of dryness. Further, we can take a lesson from the housewife in the care of a broom by not standing it in a corner, which tends to bend and fatigue the bristles, but hanging it by its handle.

Too Many Poor Brooms Used

By Engineer Maintenance of Way

I am afraid that many railway maintenance officers are too prone to accept inferior snow brooms on the basis of price, or other consideration, rather than quality and economical service life. I suspect that, in some cases, this practice is fostered by specifications, if any, antedated by technological improvements in manufacture. But as I have watched the requisitions pour across my desk after every snow storm, I have wondered whether all brooms lasted only a short time or if quality types lasted longer. Finally, I decided to check further into the matter.

Before I started, I knew that a snow broom, to be serviceable, should be capable of handling both snow that is powdery and dry or heavy and wet. I knew that the bristles should not be brittle or deteriorate too rapidly. I knew that the broom should be sturdy and have a strong handle. I knew, too, that some of our brooms lasted one day, some two and others three or more, yet I did not know why.

It didn't take long to find out that the brooms which lasted only a short time were made of broom corn; that those which lasted slightly longer were made with rattan centers and fiber on the outside; and that the most durable brooms were made entirely of fiber.

Aided by these studies and the advice of broom manufacturers, I decided on some of the things that constitute a good snow broom. First, it should be made of Calabar bass fiber which will absorb enough moisture to prolong its life and keep it flexible—as opposed to brittle—even in below-freezing temperatures. Second, it should have a substantial amount of stock, held by a metallic band—preferably one that can be removed as the broom wears down. Third, it should have a cap strong enough to withstand the hard usage given by trackmen. Lastly, it should have a strong handle made of straight-grain hardwood that will withstand strain and not splinter. Chisel points should be obtained if desired.

It is to be expected that such a

broom will cost more than a corn broom but experience has shown that its service life will be from three to five times as long. Thus, for a small fraction above the cost of a new, inferior broom, one can have a good snow broom lasting at least three times as long.

Methods of Heating Camp Cars

What is the most effective way to heat camp cars? Explain.

Problem Needs Study

By Camp Car Supervisor

Heating camp cars adequately, uniformly and safely presents problems that still need a great deal of study before the best solution is obtained. It may be that different systems are needed for different types of cars.

Most camp cars at the present time are heated in either of two ways. They either have a coal-fired stove at each end or a single stove in the center. Some roads use flat-top caboose stoves at each end of each car, while others use cast-iron "pot-belly" stoves. In those cars which have their own shower stalls, heating coils are added to the stoves to provide hot water for washing. Although stoves of this type radiate about as much heat as any that can be found, their over-all effectiveness cannot be called ideal.

When I first started to live in a camp car I thought I was smart in choosing a bunk near the stove. I should have wondered why some of the old-timers picked bunks somewhat removed from the ends, but I didn't find out until the first cold spell arrived. Then, I roasted while the shivering men from the bunks in the center of the car stoked the fire to keep from freezing. Many a time those stoves stayed so hot that the paint blistered on the ceiling and the insulation along the walls buckled. That sort of heating system is not only unhealthy, it's unsafe. In fact, one of the cars in our camp that winter caught fire when the long bolts that held the insulation facing along the wall got so hot they set the wall of the car on fire.

At least one road I know of has used a steam system for those of its cars made from old passenger equipment. Such a system would seem to be a good one. However, I understand that the pipes froze up so frequently and the system was inoperative so often that it was replaced by stoves. It would seem to me, however, that in those camps that have watchmen to care for the fires, etc., such a system would not only be satisfactory to the car occupants but also economical and safe.

Although I do not think that our present method of heating camp cars with stoves is satisfactory, I cannot offer a positive solution. I do think, however, that this problem deserves more attention than it seems to be getting. Perhaps test installations could determine the relative costs, advantages and disadvantages of various types of heating systems. For instance, these tests might show why unit heaters, either hot-water or electrically heated, are considered unsatisfactory or too costly. We might find that some large groups of camp cars, of a more or less permanent nature, could use a central heating system economically. We might even find that the best system would include individually heated rooms. On the other hand, we might find that by insulating the cars more effectively we could even heat them satisfactorily with stoves. But in any case, if we are going to continue to need winter gangs living in camp cars, shouldn't we study this problem?

Winter Work for Bridge Forces

Looking to the maintenance of uniform forces, what types of work can be carried out effectively by the bridge forces during the winter months? What types of work should not be undertaken in severe weather?

Winter Work Is Expensive

By J. W. Demcoe

Engineer Maintenance of Way, Canadian National Railways, Toronto, Ont.

In past years bridge and building work has been considered seasonal and, with the exception of small interior alterations, redecorating, repairing and painting signs, was carried out between the first of April and the last of December. However, during the past eight years it has been necessary to perform work, which otherwise would have been done in better weather, during the months of January, February and March. The necessity for this was due to a shortage of labor and poor delivery of material. Although such work as the renewal of timber trestles and bridge ties, the erection of coaling plants and water tanks, and the construction and repairing of engine pits and floors in enginehouses, has been carried out effectively during winter months, it is more expensive to perform these types of work during bad weather than during good. It is quite practical to drill masonry and concrete structures during cold weather but the grouting and intruding of such structures should not be carried out until the weather is suitable.

In spite of our wishful thinking otherwise, some things should not be done in the wintertime. For instance, it is uneconomical to perform concrete work during cold weather because it is necessary to heat the materials and keep the structure warm during the curing period. Outside painting of bridges and buildings cannot be performed during the cold and wet season. Excavation work should be kept to the minimum when the ground is frozen. Extensive heating and plumbing work should be done in the warmer weather.

All Bridge Work Possible

By B. J. Ornburn

Engineer and Superintendent of Bridges and Buildings, Chicago, Milwaukee, St. Paul & Pacific, Chicago

All bridge and building work can be effectively carried out during the winter months, and under the most severe weather conditions. In other words, the intended results can be obtained under any weather condition if adequate preparation and protection are provided, and if the cost of the work is not a consideration. When the first part of the question is worded, "what types of work can be carried out efficiently and effectively during the winter months?" it takes on a challenging meaning, and my comments herein are made accordingly.

In general, the answer to this question varies with the severity of the weather and the types of construction involved. Those of us who work in the colder states find the cost of pile driving and outside concrete construc-

tion very much higher during the winter. In territories where there is little or no frost, the conditions are reversed, and it may be more economical to drive piles and pour concrete in the winter than in the summer.

We find that in the winter months we can efficiently and effectively renew and repair open-timber floors, pile-bent caps and sway bracing; that we can frame timber bents or build timber coal docks, steel bridges and turntables. Then too, enginehouse, freighthouse and station repairs, including inside painting, can be done efficiently and effectively during the winter.

However, it requires much planning to keep concrete crews lined up for efficient work during the winter in territories similar to ours. The additional cost of heating concrete materials and of providing concrete protection during cold weather must be considered. In spite of this, the extra cost may not be enough to make repairs, such as the patching and pouring of enginehouse floors and engine pits, unreasonably high. Sometimes there are repairs to concrete structures over irrigation ditches that can be made most economically during the winter when the water is shut off —the cost of heating being much less than the cost of pumping and taking care of the water during the irrigation season. Many concrete culvert repairs can also be made during the winter at a very small increase in cost over summer work.

If "severe weather" means blizzards, such as some of us have experienced in northern states, then only emergency and light outside work should be undertaken at that time. If it means normally cold weather, it is a good time to get inside repairs made. Most of those responsible for constructing and maintaining railroad bridges and buildings deeply appreciate the service of the employees and, insofar as possible, schedule the work for constant employment. However, it is not always possible to postpone the inside work until cold weather. The character and urgency of work must be considered in making the annual programs and in arranging for crews and equipment to handle them. Programs should be made to handle the work efficiently when giving due consideration to all factors.

The maintenance of uniform forces on railroad bridge and building work is desired by both the employee and employer. Year-around work insures the employee of his regular monthly income, enables him to plan best for his family, and removes the dread and fear of bills in those expensive winter months. Year-around work permits the employer to get along with less equipment, helps hold his key and experienced employees, and provides efficient labor for emergency work. But the variety of problems in railroad bridge and building construction and maintenance is unlimited, and it is not practical to outline a general procedure that will permit the employment of uniform forces month after month, and year after year.

Damage to Water Columns

What can be done to minimize the damage to water columns that frequently occurs while engine tanks are being filled? Explain.

Instruct Crews Adequately

By V. Leak

General Foreman, Bridges, Buildings and Water Service, St. Louis-San Francisco, Tulsa, Okla.

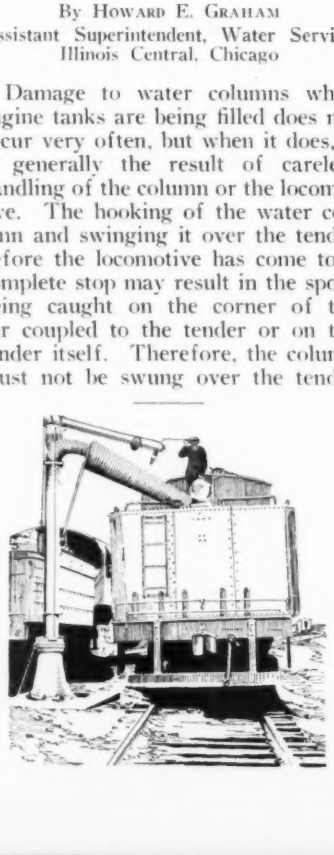
To minimize the damage to water columns that occurs when engine tanks are being filled, the greatest effort should be made to get engine crews to concentrate upon what they are doing when they are filling engine tanks. If they do, they will have brakes set correctly, coordination will be nearly perfect, work will be less hazardous, speed will be attained, and damage to columns will become negligible.

Use of Spot Boards Helps

By Howard E. Graham

Assistant Superintendent, Water Service, Illinois Central, Chicago

Damage to water columns while engine tanks are being filled does not occur very often, but when it does, it is generally the result of careless handling of the column or the locomotive. The hooking of the water column and swinging it over the tender before the locomotive has come to a complete stop may result in the spout being caught on the corner of the car coupled to the tender or on the tender itself. Therefore, the column must not be swung over the tender until the locomotive has been accurately spotted. Furthermore, a second move should not be made until after the column has been returned to its normal position.



In some cases, damage has been traceable to improper clearances or defective equipment. The height of water columns should be checked periodically to maintain sufficient clearance, thereby permitting them to swing freely over the engine tenders. Leaking throttles and defective air-brake systems have been responsible for water columns being knocked down.

Anything done to improve the conditions for spotting locomotives at water columns for the purpose of eliminating a second move will reduce the possibility of damage to the columns. The use of spot boards, the painting of the column pipes or spouts with a light colored or a luminous paint, and the use of flood lights to improve visibility at night, are some of the suggestions which might be followed to improve this condition.

Eliminate Carelessness

By E. M. Grime

Consulting Engineer, St. Paul, Minn.

The majority of accidents that damage water columns are due to carelessness that might be materially reduced if supervision of the men concerned could be made absolutely effective. Water supply is so important and necessary to the operation of a railroad that, the mechanical facility called a water column, which delivers the water directly to the locomotive tender, should always be kept in perfect operating condition. This means that the locking device which holds the spout in proper position against being blown out of line by strong winds is operative; that the counterweights which balance the weight of the spout, so that the fireman can handle it with ease, are in proper condition; that the column can be smooth-

ly turned on its base; and that the valve opens and closes smoothly, with no interference caused by accumulated rust or incrustation. Thorough cleaning and good lubrication with a heavy grease or oil at seasonable intervals, especially before the advent of cold weather, usually corrects any deficiencies of this kind.

The water service maintenance department can readily preclude the possibility of such defects occurring, but all their efforts are of little effect if a fireman tries to thrust the water spout into the tender manhole before the train has come to a stop, or gives the engineman a "high ball" to proceed before he has lifted the spout out of the manhole, allowing the train to pull or push the column out of position or break it off at the base.

To have a broken or otherwise inoperative column, especially in severe winter weather, is most annoying to the operating department, but there is little that can be done other than apply effective discipline to the men handling trains.

Germicidal Lamps in Toilets

How practicable is the use of germicidal lamps about toilet bowls and elsewhere in toilet rooms? Who should maintain such fixtures?

Lamps Not Yet "Cure-Alls"

By Sanitation Engineer

Although bactericidal lamps have been in use for a number of years, their disinfecting ability is still a controversial issue between their manufacturers and public health authorities. In fact, most state health departments will not accept the use of this type of equipment in public places under their jurisdiction as a substitute for the more conventional methods of maintaining cleanliness and sterility. Its practicability for use in railroad toilet rooms is jeopardized by this situation.

While germicidal lamps have been applied directly to toilet seats in railroad stations and are reputedly being installed in that manner in new passenger cars on two major railroads, their broadest field of application has been in the destruction of airborne bacteria. For this purpose they are usually placed high enough in the room so that the light sources cannot be seen, yet low enough to permit the rays to travel through as much air as possible.

In this type of application they have been used in schoolrooms and public auditoriums to reduce the spread of infectious diseases. The results of tests that have been made in schools and military training centers indicate that germicidal lamps can effect a 25 to 50 per cent reduction in respiratory illnesses as compared to the infections reported in unirradiated quarters.

Having shown such effectiveness in public service, germicidal lamps should warrant increased attention from railway sanitary engineers as well as public health officers. I believe that railway installations should be made at points which have been carefully selected on the basis of creating the best reaction from our patrons, rather than in an attempt to reduce or eliminate the use of scrub buckets, mops, soap, disinfectants and janitors. I doubt if germicidal lamps can ever be so efficient as to eliminate good housekeeping methods, but they can be promoters of good public relations.

Practicable Some Places

By Safety Supervisor

It has long been known that ultraviolet rays are lethal to all microorganisms that are directly irradiated, but only in recent years has a means been discovered to harness these rays for effective general use. In 1935, however, Dr. H. C. Rentschler and R. F. James, working in the laboratories of the Westinghouse Electric Corporation, pioneered the development of an ultra-violet lamp which produced rays capable of destroying organisms, either airborne or on surfaces. Since the discovery of this type of lamp, it has been improved and diversified until now it has a wide application in homes, hospitals, public restrooms and a variety of industries.

There are two types of lamps which are adaptable for use in railroad toilet rooms. One of these is of the wall type, designed to kill air-borne bacteria and produce a certain amount of ozone to eliminate or, at least, reduce objectionable odors. The other is used in conjunction with toilet seats and is designed to kill all bacteria on the top surface and sides of the seats while they are automatically held in a raised position when out of use.

Neither of these units is designed to eliminate the need for good housekeeping. Both are practicable for the purpose for which they were designed, as far as I have been able to discover, if they are correctly installed and adequately supervised.

In certain locations where supervision is infrequent, the toilet-seat type might appeal to the moronic type of passenger-station habitue—as a gadget and, as such, be subjected to an abnormal amount of vandalism. The installation of lamps in such locations is impracticable and should not be considered.

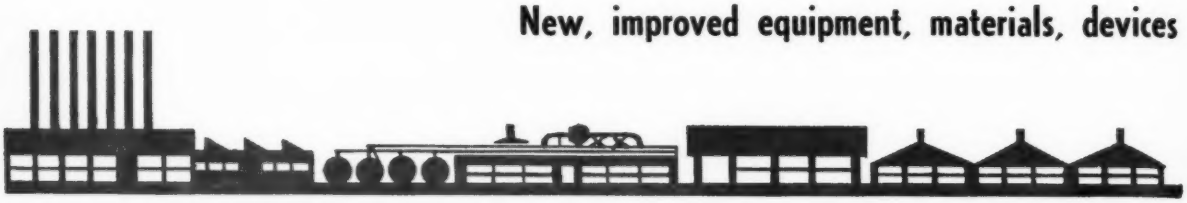
The decision as to who should maintain such fixtures rests with the individual railroad. It would seem logical that they should be maintained in the same manner as other facilities of their type.

(Photo courtesy Oxweld Railroad Service Company)

Placing a length of continuous welded rail on the Elgin, Joliet & Eastern

PRODUCTS OF MANUFACTURERS

New, improved equipment, materials, devices



(For additional information on any of the products described in these columns, use postcards, page 1305)

Ballast Dresser

THE Kershaw Company, Montgomery, Ala., is introducing a ballast regulator and dresser consisting of two drag-type wings mounted on a heavy-duty push car. The wings are raised and lowered by cables leading to two-speed hand-operated hoists mounted on the push car by means of A-frames. The push car has 2-in. differential axles, a 4-in. steel channel frame and 2-in. oak flooring. The unit is pulled by a heavy-duty motor car and is recommended for section-gang use.

Each wing is built with two pockets and an open bottom, and is equipped with scarifying teeth to keep the shoulder crust broken up. Adjustments of the wings can be made for dressing any standard railroad ballast section from the ends of the ties out. Such adjustments can be made rapidly in the field with ordinary track tools. The push car unit, weighing approximately 1,500 lb., can be turned off the track at a highway crossing by four men. It is equipped with clip holes in order that lining bars may be used in turning it around or removing it from the track.

The operating procedure recommended by the manufacturer is, first, to scarify approximately three miles of track, then, after turning around, to regulate the high and low places on a return trip, and finally, to shape the ballast on a third trip. In this way on the completion of a given stretch of track the machine is located at the far end and is in a position, therefore, to begin work on the next stretch.

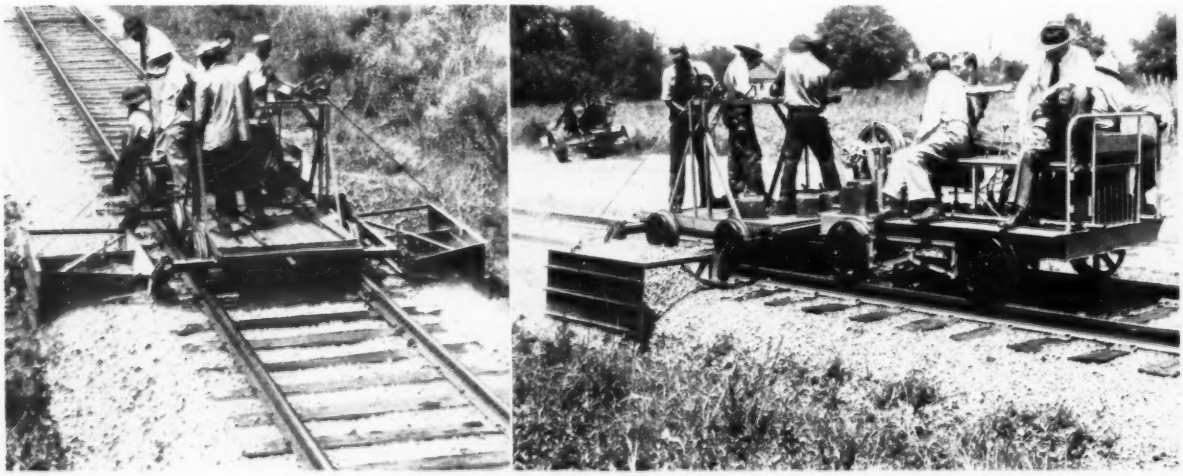
The wings can be set to pull the toe-line ballast back up to the ends of the ties. In new ballasting operations the ballast can be regulated ahead of the surfacing where uneven unloading occurs. It is said that the wings will carry ballast along the shoulder for a distance of approximately 100 yd. and distribute it in the low places to the desired ballast section. It is claimed that with this machine a section gang can regulate, scarify and dress about five to six miles of track per day.

Heavy-Duty Chain Saw

HENRY Disston & Sons, Inc., Philadelphia, Pa., has announced a heavy-duty, two-man, 12-hp. chain saw for heavy-duty timber cutting and for sawing wet, frozen or hard wood.

The Disston heavy-duty, two-man, 12-hp. chain saw

The important features of the saw include a lightweight Mercury gasoline engine with full precision bearing construction throughout; a transmission housing of strong design, including reinforcing ribs to absorb shocks; an abutment plate with a new shape which prevents the engine from pulling under the log or timber as the cut is completed; an automatic chain lubricator which requires no control on the part of the operator; a quick-detachable tail stock of aluminum-alloy construction; a guide rail which has been modified to permit quick removal from either the engine or the



Two views of the Kershaw ballast regulator and dresser in operation

tail-stock end; a simplified chain-tensioning method; a carburetor and magneto mounted underneath the unit for protection against falling limbs; and a fuel tank and fan housing of tough aluminum-alloy construction.

Floor Patch

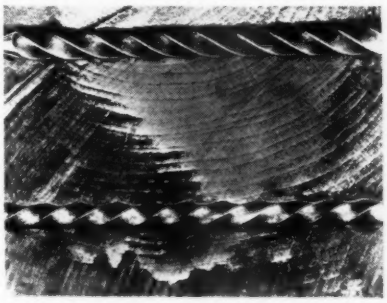
A NEW fast-drying product, known as Tampatch, for the rapid repairing of broken, rough or uneven concrete surfaces, either interior or exterior, which, it is claimed, can withstand heavy traffic loads after application, has been announced by United Laboratories, Inc., Cleveland, Ohio. It is said that floors patched with the product can be placed in service almost immediately after application, thus avoiding the need of closing off such areas for lengthy periods.

Tie Doweling Machine

A MACHINE for the rapid insertion of spiral (anti-splitting) dowels in crossties, switch ties, bridge ties and similar timbers is now being offered to railroads, and to tie producers and treaters, on a lease basis, by the Graham Tie Dowel Service Company, Columbus, Ohio. Equipped with sequence valves and limit switches, the machine is entirely automatic in operation and is controlled by a push button. With a single unit two separate operations are required to dowel both ends of a tie; with a double unit arrangement, however, both ends of a tie or timber can be doweled simultaneously.

A single machine consists essentially of a centrally-located, hydraulic-cylinder-actuated press, a roller-and-track mounted drill stand on one side of the press, with two motor-driven drill bits; and a magazine-fed dowel pusher on the other side of the press—all mounted on a structural steel base. The press is adjustable for doweling of timbers up to 18 in. in width, and the drills can be adjusted to produce holes ranging from 2½ in. to 9½ in. apart.

In a single-unit operation the tie is fed to the machine on a roller track. This operation requires two positions of the tie, one for doweling each end. When the entering end of the tie reaches the first position, the press closes automatically, holding the tie firmly and exerting on the tie end any predetermined pressure within a range of 12 to 30 tons, closing all checks or splits. When the required pressure in the press cylinder is reached the drill stand moves forward, forcing the drill bits through the tie. As soon as the holes are drilled the drill stand retreats to its original position, while, simultaneously, dowels are forced into the holes from the opposite side of the tie by the dowel pusher, which causes rotation of the dowels, creating their own threads within the tie. When the dowels are in place the press opens automatically, completing the operation, and the tie is pushed through the machine onto a leaving roller track to the second boring and doweling position. Here, the operation is repeated for the opposite end of the tie. It is said that with a single unit three ties can be doweled per minute.



A cross section of a doweled tie

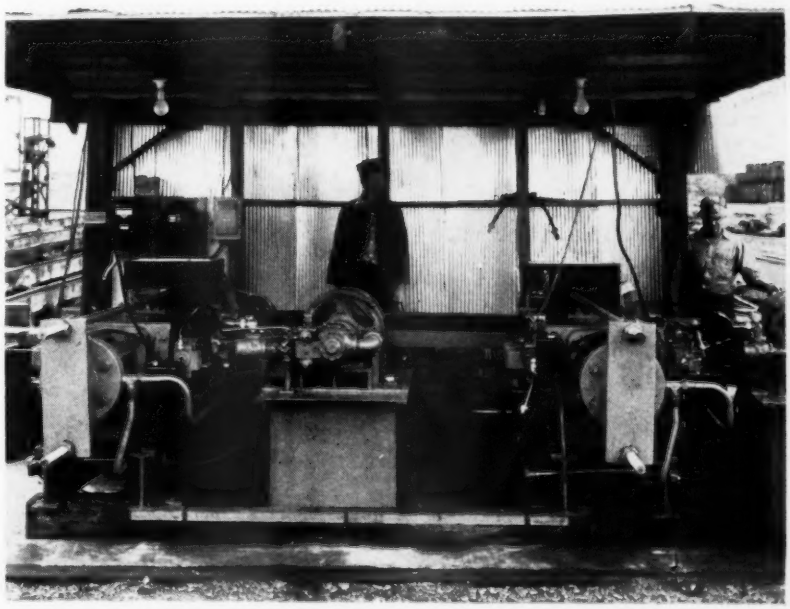
Where a double doweling unit is used, the tie is first fed to a conveyor consisting of two chains driven by a speed reducer which is directly connected to an electric motor. After the tie reaches the approximate position where it is to be bored and doweled, the conveyor stops and the tie is equalized or centered by a centering device automatically set in motion when the tie reaches the working position. The presses, drills and dowel pushers of both units then operate in unison, causing both ends of the tie to be processed simultaneously. Under this setup it is said that six ties can be doweled per minute.

Hard-Facing Electrodes

THE Lincoln Electric Company, Cleveland, Ohio, has added two new tubular-type shielded-arc electrodes to its line of hard-facing electrodes. One is known as Faceweld No. 1 and the other as Faceweld No. 12. Electrodes previously manufactured under the name "Faceweld" have been discontinued in favor of the new electrodes, which are said to have a higher consistency in the deposited alloy and a lower cost.

Faceweld No. 1 deposits a chromium-carbide type alloy surface and is used for hard facing parts of plain carbon, low alloy or manganese steel. It is designed to resist severe abrasion as well as moderate impact. Single-layer deposits have a Rockwell C hardness ranging from 40 to 52. Multiple-layer beads have a Rockwell C hardness ranging from 52 to 60.

Faceweld No. 12 is similar to Faceweld No. 1 but is designed for use where the hard-faced surface must withstand extremely severe abrasion as well as some impact. The deposit is harder but not as tough as that of Faceweld No. 1. Single-layer



Applying dowels to a tie in a double-unit operation

(For additional information on any of the products described on this page, use postcards, page 1305)

deposits have a Rockwell C hardness ranging from 45 to 55, and multiple layer deposits from 55 to 64. It is said that the deposits of both electrodes maintain high abrasion and hardness values at red heat, and that their corrosion resistance is comparable, generally, to that of stainless steel. Both electrodes operate on either alternating or direct current.

The Faceweld electrodes are recommended by the manufacturer for use on all types of excavating and earth-working equipment, such as dragline and shovel bucket lips and teeth, grader blades, conveyor guides and sleeves, and screw conveyors, and all types of machinery where impact, abrasion or corrosion cause wear of parts.

Concrete Breaker

THE Independent Pneumatic Tool Company, Aurora, Ill., has announced a new pneumatic concrete breaker, known as the Thor "24," for work just under the heavy-duty class. The new tool weighs 70 lb. and thus fills the gap between the Thor 84-lb. "25" heavy-duty breaker and the 59-lb. "23" light-duty tool.

The Thor "24"

The new breaker is 28 in. long with a 1½-in. by 6-in. (1⅛ in. by 6-in. optional) chuck for collared steels, and has a ¾-in. hose inlet pipe thread. It is said that two of the Thor "24s" will operate from one 105-c.f.m. compressors.

Tie-Tamping Gun

INGERSOLL-RAND, New York, has developed a new pneumatic tie-tamping tool, designated as Model MT-4, which is reported to use 40 per cent less air for operation than Model MT-3 which it replaces. The new tool uses 6½ c.f.m. of air at 80 p.s.i.

Except for its economy in air consumption, the MT-4 is similar to the MT-3 in both appearance and general dimensions. The new tool strikes the same number of blows per minute as the older model and the force of the blow is likewise reported as being the same as that of its predecessor.

Tamping track with the new I-R Model MT-4 tamping gun

Development of the new tool permits the use of an increased number of tools with any given compressor and, in many cases, permits tamping operations to be done with a compressor of smaller size than that required with the older model tampers.

Off-Track Joint Oiler

THE Woolery Machine Company, Minneapolis, Minn., has developed a self-propelled, off-track unit designed for spraying rail joints in track with the heavier grades of oil, in order to reduce the number of oil applications required. The joint oiler consists essentially of a rotary gear-type pump and a four-cycle air-cooled engine, both mounted on top of a 25-gal. tank which, in turn, rests on a three-wheel, rubber-tired chassis with a guiding handle at the single wheel end. The machine is propelled by a friction drive. When the operator is ready to move the machine ahead he operates a single hand lever, engaging the tires with a roller-bearing counter shaft driven from the engine.

The 25-gal. tank is equipped with a heater of sufficient capacity to permit use of the heavier grades of lubricants. Means is provided for inserting the hoses into the tank and locking the valves open so that the oil can be circulated during work interruptions. This feature permits immediate resumption of spraying at the termination of the interruption. The machine is equipped with an auxiliary tank which holds two gallons of fuel oil for rinsing the oil pump, lines and nozzles when the day's work has been completed. A three-way valve permits changing from spraying to rinsing in less than one minute, it is said.

Having an overall width of only 30 in., the unit can be operated between double tracks with ample clearance. It can also be turned around between tracks. Handles are provided for lifting the unit over cross tracks or turnouts which may be encountered when working in yards or terminals.

It is said that three men using a Woolery off-track joint oiler can spray the joints of 1½ mi. of track in an hour. Standard equipment includes two 16-ft. lengths of hose with flat spray nozzles having trigger-type valves.

The Woolery off-track joint oiler

(For additional information on any of the products described on this page, use postcards, page 1305)

THE MONTH'S NEWS

Happenings among the railways—the associations—the suppliers

Changes in Railway Personnel

General

H. F. Smith, division engineer of the Reading at Tamaqua, Pa., has been promoted to assistant superintendent, with headquarters at Philadelphia, Pa.

John C. Wallace, chief engineer of the New York, Chicago & St. Louis, has been promoted to general manager, with headquarters as before at Cleveland, Ohio.

James L. Cranwell, general superintendent of the Lake division of the Pennsylvania, with headquarters at Cleveland, Ohio, and an engineer by training and experience, has been transferred to the Western Pennsylvania division, with headquarters at Pittsburgh, Pa.

T. E. Gilhooley, assistant superintendent of the Columbia district of the Atlantic Coast Line, and an engineer by training and experience, has been promoted to superintendent of that district, with headquarters as before at Florence, S.C.

Engineering

J. B. Styles has been appointed assistant to engineer of statistics of the Atlantic Coast Line, with headquarters at Wilmington, N.C.

Clarence Young, field engineer on the Baltimore & Ohio, has been appointed assistant engineer, with headquarters at Baltimore, Md.

S. V. Flanagan, field draftsman on the Chesapeake & Ohio, has been appointed assistant cost engineer, with headquarters at Richmond, Va.

R. W. Mabe, whose promotion to assistant chief engineer of the Nashville, Chattanooga & St. Louis at Nashville, Tenn., was reported in the October issue, was born on February 1, 1902, at Corryton, Tenn. He attended public schools at the latter point and received his higher education at the University of Tennessee, where he majored in civil engineering. Mr. Mabe was structural engineer for the city of Knoxville, Tenn., from 1924 to 1930, after which he served for three years in a similar capacity with the Cincinnati Union Terminal. From 1933 to 1943 he served as senior structural engineer in charge of railroad bridges for the Tennessee Valley Authority. Mr. Mabe joined the N.C. & St.L. on April 15, 1943, as bridge engineer, and was promoted to

R. W. Mabe

senior assistant engineer on December 16, 1947, serving in the latter position until his recent advancement.

V. V. Holmberg, whose appointment as engineer maintenance of way of the Chicago & Western Indiana and the Belt Railway of Chicago, with headquarters at

V. V. Holmberg

Chicago, was announced in the October issue, was born on May 8, 1911, in Council Bluffs, Iowa. Mr. Holmberg attended the University of Missouri and began his railway career with the Wabash in 1928 as a track laborer. He worked intermittently during school years on the Western district of the Wabash at Moberly, Mo., and subsequently worked with the U.S. Coast & Geodetic Survey, returning to the Wabash in 1935. Mr. Holmberg held positions with the Wabash as chainman, rodman, bridge inspector and assistant engineer, and in July, 1937, he joined the C. & W.I. and Belt of Chicago as levelman. He later served successively as draftsman, chief clerk, track supervisor and bridge and building supervisor. He was serving as assistant engineer at the time of his recent appointment.

I. A. Moore, senior assistant engineer of the Chicago & Eastern Illinois, with headquarters at Danville, Ill., has been promoted to division engineer at that point, succeeding **C. Brannon,** who retired on November 1.

James P. Bolling, formerly assistant supervisor of bridges and buildings of the Louisville & Nashville at Mobile, Ala., has been appointed assistant division engineer at Louisville, Ky. He succeeds **Robert B. Lindsey,** who has been transferred to the office of chief engineer at Louisville.

M. A. Roose, assistant engineer on the Southern at Washington, D.C., has been appointed resident engineer at Jackson, Ala. **D. E. Hoeffel,** junior engineer, has been promoted to assistant engineer, with headquarters at Cincinnati, Ohio.

W. V. Smith, assistant engineer on the Gulf, Colorado & Santa Fe, with headquarters at Galveston, Tex., has been promoted to division engineer at Temple, Tex., succeeding **W. Y. Ware,** whose appointment as construction engineer was noted in the November issue.

H. E. Womack has been appointed division engineer on the Southern division of the Chicago, Rock Island & Pacific, with headquarters at Fort Worth, Tex., succeeding **R. B. Fetters,** who has been transferred to El Reno, Okla., in place of **W. P. Hale,** transferred.

C. E. Schofield, assistant master carpenter of the Carolina division of the Seaboard Air Line, with headquarters at Savannah, Ga., has been promoted to assistant division engineer with the same headquarters, succeeding **C. A. Beggs,** who has been transferred to the North Florida division, with headquarters at Jacksonville, Fla.

(*Please turn to page* 1300)

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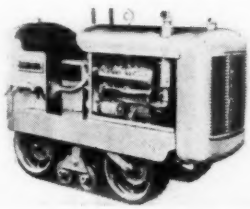
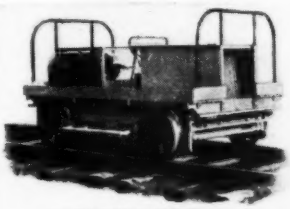
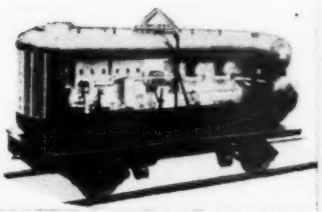


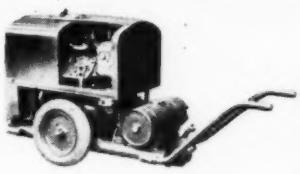
Model 60 Crawler for 4 tampers.



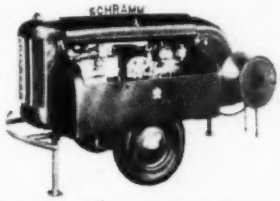
Model 60 self-propelled rail car.



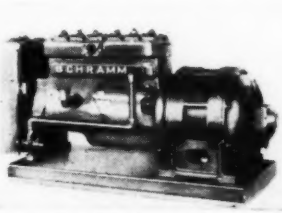
Railcar mounted, 105 to 420 cubic feet actual air capacity.



Model 60 Tampair for 4 tampers.



Two-wheel trailer, 60 to 105 cubic feet actual air capacity.



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You have certain jobs for compressors to do; Schramm has the models and sizes to do them. A few are shown here. Others to fill any railroad need—and the tools to go with them—are described in Schramm bulletins FC 48 and T 48. Address *Railway Sales Division* for your copies today.

SCHRAMM INC.
THE COMPRESSOR PEOPLE
WEST CHESTER
PENNSYLVANIA

Railway Personnel (Cont'd)

W. O. Cudworth, engineer maintenance of way of the Eastern region of the Canadian Pacific, who has been on leave of absence on account of illness, has been appointed special engineer, with headquarters as before at Toronto, Ont.

N. I. Huntley, master carpenter of the St. Louis division of the Pennsylvania, with headquarters at Terre Haute, Ind., has been appointed assistant engineer on the Long Island, with headquarters at Jamaica, L.I.

H. F. Whitmore, assistant to the chief engineer of the New York, Chicago & St. Louis, has been promoted to chief engineer, with headquarters as before at

H. F. Whitmore

Cleveland, Ohio, succeeding **John C. Wallace,** whose promotion to general manager is noted elsewhere in these columns. **R. E. Oberdorf,** division engineer of the Lake Erie & Western district, with headquarters at Frankfort, Ind., has been promoted to assistant to chief engineer at Cleveland, succeeding Mr. Whitmore. **R. L. Mays,** designing engineer at Cleveland, has been advanced to division engineer of the Clover Leaf district, with headquarters at Frankfort, in place of **M. B. Allen,** who, in turn, succeeds Mr. Oberdorf.

Mr. Whitmore was born on May 25, 1890, at Red House, N.Y. He attended Ohio Northern university for three years before joining the Nickel Plate as a rodman at Cleveland in 1916. Following service with the 25th Engineers Corps in World War I, he resumed his education at Edinburgh university, Scotland. Mr. Whitmore later returned to the Nickel Plate as a rodman at Conneaut, Ohio, and was assigned to various engineering posts at Indianapolis, Ind., and Frankfort. He was advanced to assistant to the chief engineer at Cleveland on May 1, 1945, which position he held until his recent appointment.

Samuel Murray, resident engineer of the Northwestern district of the Union Pacific, with headquarters at Portland, Ore., has retired after 46 years of railway service. Mr. Murray plans to enter private engineering practice in Portland.

John P. Gannon, whose appointment as division engineer of the Minneapolis, St. Paul & Sault Ste. Marie, with headquarters at Stevens Point, Wis., was reported in the October issue, was born on July 26, 1913, at Larchwood, Iowa, and was graduated from South Dakota State College in 1936. He entered the service of the M.St.P. & S.S.M. in 1941 as a rodman at Stevens Point. In 1943 Mr. Gannon was appointed instrumentman and two years later he was advanced to assistant engineer, which position he held until his recent promotion to division engineer.

J. R. Caswell, assistant engineer maintenance of way, Eastern region, Canadian Pacific, with headquarters at Toronto, Ont., has been promoted to district engineer at North Bay, Ont., succeeding **J. E. Armstrong, Jr.,** transferred. **G. W. Miller,** district engineer at Toronto, succeeds Mr. Caswell, and **N. B. Roberts,** division engineer at Toronto, has been appointed assistant district engineer at that point to replace **W. C. E. Robinson,** who has been promoted to district engineer to succeed Mr. Miller. **J. S. Smith,** division engineer at Farnham, Que., has been transferred to Toronto to replace Mr. Roberts.

Donald E. Brunn, engineer maintenance of way of the Toledo, Peoria & Western, has been appointed assistant engineer, with headquarters as before at Peoria, Ill. The position of engineer maintenance of way has been abolished. **Randle O. Egbert,** of the engineering firm of Sverdrup & Parcel, of Chicago, and former assistant engineer of the Ann Arbor and the Wabash at St. Louis, Mo., has been appointed assistant engineer of the T. P. & W. at Peoria, supervising government construction of the railroad in the Farm Creek area.

Albert D. Perkins, Jr., whose promotion to assistant to chief engineer, maintenance of way of the Southern, with headquarters at Birmingham, Ala., was announced in the September issue, was born on August 21, 1894, at Memphis, Tenn. He entered the service of the Southern in May, 1911, as a rodman and levelman and later served as transitman and draftsman. In January, 1926, he became field draftsman at Danville, Ky., and in June, 1927, was made junior engineer at Chattanooga, Tenn. He was promoted to assistant engineer at Chattanooga in August, 1927, transferring in that capacity to Birmingham, Ala., in August, 1931. Since August, 1934, he has been assistant engineer maintenance of way, at Birmingham.

R. F. Garner, whose appointment as assistant engineer of the Portland division of the Boston & Maine, with headquarters at Dover, N.H., was reported in the October issue, was born at Providence, R.I., on August 28, 1916. He graduated from Brown University in June, 1940, with a civil engineering degree, and entered the service of the Boston & Maine in July, 1940. Mr. Garner subsequently held positions as chainman and rodman and in February, 1941, was furloughed for military service. He returned to the B. & M. in March, 1946, as a student supervisor and in July, 1947, was transferred to the Portland division at Dover, N.H., as assistant track supervisor, the position he was holding at the time of his recent promotion.

Thomas B. Hutcheson, assistant division engineer of the Seaboard Air Line, with headquarters at Raleigh, N.C., has been advanced to assistant to the chief engineer, with headquarters at Norfolk, Va., where he succeeds **J. H. Gill,** who has resigned after 24 years service to enter private practice in Starke, Fla. Mr. Hutcheson was born on November 3, 1913, in Gloucester, Va., and was educated at Virginia Polytechnic Institute, graduating in mechanical engineering in 1935. He entered the service of the Seaboard on June 20 of that year as apprentice-foreman on the Georgia division, being promoted to as-

Thomas B. Hutcheson

sistant to the division engineer at Tampa, Fla., on June 1, 1937, and later served in this capacity at Savannah, Ga. In November, 1939, he was promoted to assistant division engineer at Atlanta, where he remained until January 26, 1942, when he was furloughed for service in the army, from which he was discharged as a major. Mr. Hutcheson returned to his former position at Atlanta in February, 1946, and was transferred to Raleigh in August, 1947, being located at that point at the time of his recent promotion.

Allan E. Haywood, whose promotion to assistant engineer maintenance of way of the Grand Trunk Western, with headquarters at Detroit, Mich., was reported in the November issue, was born at Port Huron, Mich. He studied civil engineering with the International Correspondence Schools for three years, prior to which time he served with the G. T. W. as a machinist apprentice at Battle Creek, Mich. He was appointed car record clerk in the transportation department in 1916, and in the following year he became instrumentman in the engineering department, Chicago division, with headquarters at Battle Creek. He was appointed assistant engineer on the Chicago division in 1918, and served continuously in that position until his recent promotion. His new assignment includes jurisdiction over both the Detroit and Chicago divisions.

(*Please turn to page* 1302)

BETTER PERFORMANCE *with* LOWER FIRST COST!

Every effort has been made to develop the methods involved in the manufacture of Heat-Treated constructions, to meet the need for better railroad crossings to serve the increasingly severe traffic demands. The WEIR KILBY HEAT-TREATED CROSSING is the culmination of these efforts. It will stand up under heavier loads, greater impacts, higher speeds and severe traffic conditions. It is lower in first cost than many crossings of other heavy duty constructions and in most cases will prove more economical to maintain.

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Railway Personnel (Cont'd)

W. S. Brown, assistant division engineer of the Pittsburgh division of the Baltimore & Ohio, with headquarters at Connellsville, Pa., has been appointed assistant engineer in the office of the chief engineer, Baltimore, Md., and **C. E. Jackman,** assistant division engineer of the Newark division, with headquarters at Newark, O., has been transferred to the Pittsburgh division, at Connellsville, succeeding Mr. Brown. **E. M. Cummings,** assistant on the engineering corps on the Eastern region has, in turn, been promoted to assistant division engineer of the Newark division, replacing Mr. Jackman. **W. O. Nelson,** district bridge inspector on the Eastern region, has been promoted to assistant maintenance engineer in the office of the chief engineer at Baltimore, succeeding **G. F. Eberly,** who retired on November 1.

W. N. Myers, assistant divison engineer on the Philadelphia division of the Pennsylvania, with headquarters at Harrisburg, Pa., has been promoted to division engineer at Indianapolis, Ind., succeeding **J. P. Zearley,** who has been transferred to Cleveland, Ohio, to replace **W. P. Conklin.** Mr. Conklin has been appointed division engineer at Chicago, succeeding **W. R. Ganser,** whose death is reported elsewhere in these columns. **W. R. Garner,** supervisor of track at Harrisburg, succeeds Mr. Myers as assistant division engineer. **W. R. Taggart,** master carpenter at Jersey City, N. J., has been appointed assistant engineer in the office of chief engineer maintenance of way of the New York zone, with headquarters at New York. **N. I. Huntley,** master carpenter at Terre Haute, Ind., has been appointed assistant engineer on the Long Island.

J. F. Davison, assistant engineer of the Northern Ontario district of the Canadian National, with headquarters at North Bay, Ont., has been promoted to division engineer at Levis, Que., succeeding **H. J. Fast,** who has been advanced to district engineer at North Bay in place of **W. H. B. Bevan,** who has retired. **E. T. Gove,** assistant district engineer at North Bay, has been promoted to division engineer at London, Ont., to succeed **G. L. P. Plow,** who has been appointed general maintenance inspector at Montreal, Que. **Benjamin Chappell,** engineer of track at Winnipeg, Man., has been appointed district engineer of the Manitoba district, with the same headquarters, succeeding **N. M. Waddell,** deceased. **S. J. H. Waller,** assistant district engineer, with headquarters at Quebec, Que., has retired after 42 years of railway service. **R. A. de Villers** has been appointed assistant district engineer at Quebec.

Mr. de Villers was born in Victoriaville, Que., August 18, 1919, and was educated at the Ecole Polytechnique and Montreal university, obtaining the degrees of B.A. (1937) and C.E. and B.A.Sc. (1942). After serving with the Canadian Marconi Company, Montreal, Que., as mechanical engineer, he entered railway service on March 15, 1945, as assistant engineer, Bureau of Research, Montreal, and was appointed, in 1946, assistant engineer of the Quebec district at Quebec, the position he held until his recent promotion.

Spencer Danby, whose appointment as valuation engineer on the Pennsylvania, with headquarters at Philadelphia, Pa., was announced in the November issue, was born at Easton, Pa., in 1893, and was graduated from Lafayette College with a degree in civil engineering. Mr. Danby entered the service of the Pennsylvania in

Spencer Danby

1915 as a draftsman and served in various engineering capacities, including supervisor, assistant division engineer and division engineer before being appointed assistant valuation engineer in November, 1941. He held the latter position at the time of his recent promotion to valuation engineer.

Track

F. J. Myers, extra gang foreman on the Atchison, Topeka & Santa Fe, has been promoted to track supervisor at Trinidad, Colo.

J. Pickrel has been appointed acting roadmaster on the Chicago, Burlington & Quincy, with headquarters at Lincoln, Neb., succeeding **J. L. Baker,** who has retired.

F. Dickson, roadmaster on the Port Arthur division of the Canadian National, with headquarters at Port Arthur, Ont., has been transferred to the Winnipeg Terminal division, succeeding **R. Dennis,** who has retired.

L. S. Strohl, branch-line supervisor of track on the Philadelphia division of the Pennsylvania, at Earnest, Pa., has been transferred to the main line of that division at Downington, Pa., replacing **F. H. Lewis,** who has been transferred to Chambersburg, Pa., also on the Philadelphia division. Mr. Lewis succeeds **H. T. Matthews,** who, in turn, succeeds Mr. Strohl at Earnest.

R. A. Jones, junior engineer on the Western region of the Pennsylvania, has been promoted to assistant supervisor of track-branch line on the Williamsport division, at Lock Haven, Pa., where he succeeds **M. L. Stone,** who has been transferred to the main line of the Middle division at Altoona, Pa. Mr. Stone replaces **E. J. Maggi,** who has been granted a leave of absence.

Earl E. Hamilton, extra-gang foreman on the Southern at Jersey, Tenn., has been promoted to track supervisor at Knoxville, Tenn., succeeding **John C. Beeler,** who has been transferred to Sheffield, Ala., where he replaces **Rush A. Kelso,** whose promotion to bridge and building supervisor at Valdosta, Ga., is noted elsewhere in these columns.

Mr. Hamilton was born in McDonough, Ga., on January 6, 1907. He entered the service of the Southern in March, 1924, as a section laborer at Flippen, Ga., and in April, 1929, he was made apprentice foreman at McDonough, Ga. After a leave of absence from November, 1938, to October, 1940, he returned to McDonough, becoming a tractor operator in January, 1942. He was appointed assistant foreman in November, 1942, and section foreman in January, 1943. He has been serving as extra-gang foreman at Jersey since October, 1944.

E. B. Francis, assistant supervisor of track on the Mohawk division of the New York Central, with headquarters at Fonda, N.Y., has been promoted to supervisor of subdivision 18, St. Lawrence division, with headquarters at Gouverneur, N.Y., where he succeeds **W. R. Benish,** who has been transferred to subdivision 26, Pennsylvania division, with headquarters at Jersey Shore, Pa., replacing **L. G. Bell.** Mr. Bell has been transferred to subdivision 13, Buffalo division, with headquarters at Buffalo, replacing E. V. Grogan, who, in turn, has been transferred to sub-division 1, Electric division at New York, to succeed **J. E. Egan,** who retired November 1, after 51 years of service. **S. H. Fredericks, Jr.,** rodman on the Pennsylvania division, with headquarters at Jersey Shore, has been promoted to assistant supervisor of subdivision 29, Eastern division, at Brewster, N.Y., where he succeeds **William J. Bergano,** who has been transferred to subdivision 6 on the Mohawk division at Fonda, to succeed Mr. Francis.

Edward J. Sierleja, whose promotion to supervisor of track on the Indianapolis division of the Pennsylvania with headquarters at Columbus, Ind., was noted in the September issue, was born at Brookings, S.D., on October 16, 1919. He attended the University of Michigan, receiving the B.S. degree in civil engineering in 1943. He entered the service of the Pennsylvania on February 8, 1943, as engineer apprentice on the Toledo division and was promoted to assistant on the engineering corps on August 1 of that year, later serving on the Ft. Wayne division. Between August 1, 1944, and May 1, 1946, Mr. Sierleja served in the Navy, as gunnery officer, and on the latter date returned to the Pennsylvania at Morrow, Ohio. He was promoted to assistant supervisor of track-branch line at Cresson, Pa., on April 1, 1947, and was transferred to the main line on July 15 of that year, being located on the Maryland division at Baltimore, Md.

(*Please turn to page* 1304)

"I would like to have you spray our 4,000 miles in one day"

THAT'S A BIG ORDER—IS IT NOT?

"I know, of course, it can't be done. However, I will state that my company awards their contract to the READE COMPANY each year because in my opinion you come as close to this accomplishment as it is possible to come. You have the plant capacity to keep up with our schedule, your spray equipment is big and fast, and best of all your men are exceptionally able and cooperative."

"WEED KILLING IS A JOB THAT I WANT TO CLEAN UP IN THE SHORTEST POSSIBLE SPACE OF TIME."

Here is a man who knows that there is something more to a weed killing contract than a formula and a promise to get the work done.

Railroads award contracts on a basis of past performance. Once the ink on the contract is dry they expect the work to proceed with a minimum of effort on the part of the railroad.

This is true in particular as related to a weed control contract.

Worktrain service is always short. Railroads don't want to see any time on such service wasted. Chemical weed killer must be shipped on a pre-arranged schedule, arriving several days at least ahead of schedule to provide a necessary margin of safety.

Spray equipments must be well designed, almost trouble proof. They must be big and have the capacity to assure big daily accomplishment.

And perhaps most important of all, spray train supervisors must be men of the right type, men who don't work by the clock, but work to do a bang up job for the railroad. Such men are as scarce as hen's teeth. It has been our good fortune to recruit a group of such men and to them goes much of the credit for our record of performance in weed control work on a long list of railroads each year.

PERHAPS THIS TYPE OF SERVICE IS WORTH YOUR CONSIDERATION IN MAKING PLANS FOR A 1949 WEED CONTROL CAMPAIGN.

READE MANUFACTURING COMPANY, INC.

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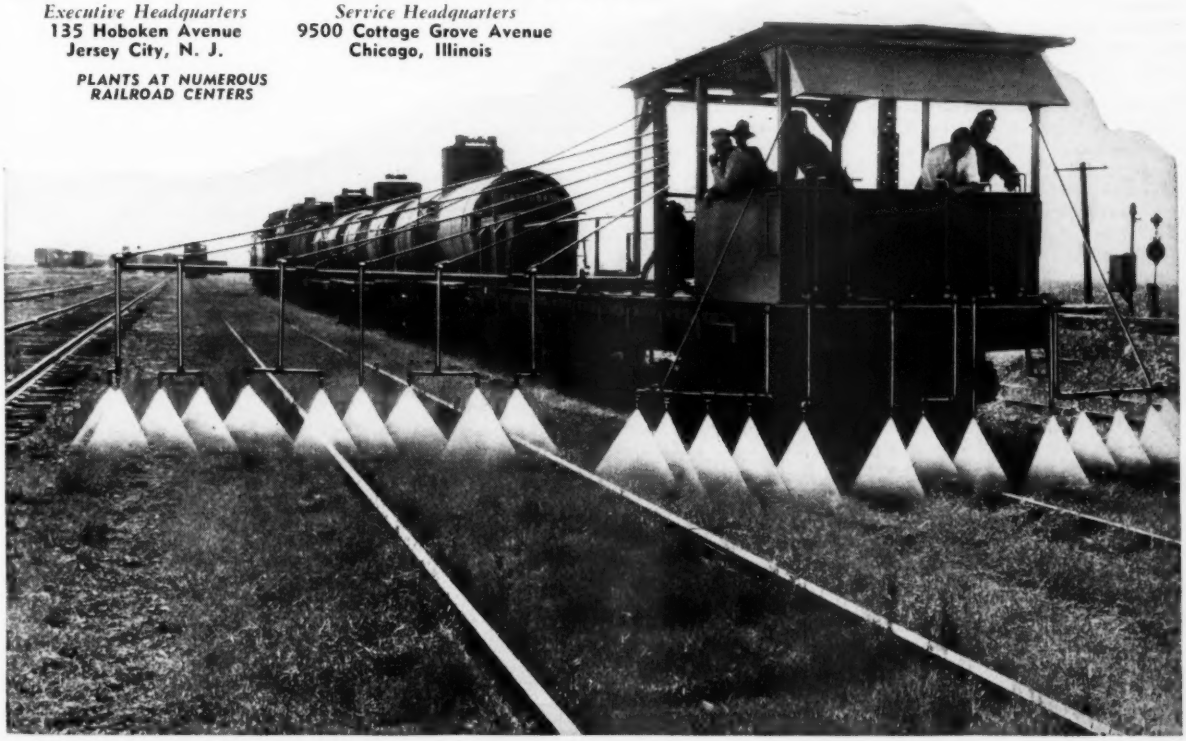
PLANTS AT NUMEROUS RAILROAD CENTERS



Railway Personnel (Cont'd)

D. J. Marotta, supervisor on the Wilkes-Barre division of the Pennsylvania, with headquarters at Reading, Pa., has been transferred to Harrisburg, Pa., succeeding **W. R. Garner,** whose appointment as assistant division engineer is noted elsewhere in these columns. **T. C. Netherton,** supervisor of track at Wheeling, W. Va., succeeds Mr. Marotta.

J. L. Stone has been appointed roadmaster on the Atlantic Coast Line, with headquarters at Leesburg, Fla. Mr. Stone was born on September 12, 1915, at Sellars, S.C., and entered the service of the A.C.L. in January, 1936, as a laborer on the bridge force. He subsequently worked as a laborer on the work train and ballast gangs, and served as relief section foreman and lamplighter until May, 1939, when he went with the Norfolk & Portsmouth Belt Line. In 1943 Mr. Stone rejoined the A.C.L. as a section foreman at Elrod, N.C., being advanced to rail gang foreman in November, 1944, and acting roadmaster in October, 1946.

C. M. Kern, assistant supervisor of track on the Mountain subdivision of the Chesapeake & Ohio, with headquarters at Clifton Forge, Va., has been promoted to supervisor on the Piedmont subdivision at Gordonsville, Va., succeeding **W. K. Putney,** who has been transferred to the James River, Lexington and Craig Valley subdivisions, with headquarters at Balcony Falls, Va., to succeed **J. F. Painter,** who retired on October 1. **K. E. Bomar** has been appointed assistant supervisor at Clifton Forge, replacing Mr. Kern. **R. S. Coleman** has been appointed assistant supervisor of track at Marion, Ohio, succeeding **P. W. Shenefield,** who has been promoted to supervisor of track at Columbus, Ohio, as reported in the November issue.

Dewey H. Harris, who was recently promoted to supervisor of track on the Renovo division of the Pennsylvania, with headquarters at Reynoldsville, Pa., as noted in the October issue, was born in Stewart County, Tenn., on November 4, 1900. He entered the service of the Pennsylvania on August 19, 1925, as a trackman on the St. Louis division and became a foreman on March 5, 1926. He subsequently served as foreman on the Western Region rail train and as extra-gang foreman until June 25, 1942, when he was promoted to general foreman on the St. Louis division and later served in this capacity on the Ft. Wayne and Toledo divisions. On December 1, 1944, he was promoted to assistant supervisor of track on the Eastern division, with headquarters at Wooster, Ohio, transferring to Orrville, Ohio, in 1947, and remained at the latter point until his recent promotion to supervisor of track.

Robert R. Baldwin, whose promotion to supervisor of track on the Cleveland division of the Pennsylvania, with headquarters at Orrville, Ohio, was announced in the October issue, was born November 10, 1920, at Washington, D.C. Upon his graduation from the University of Maryland, in 1942, he entered the service of the Pennsylvania as assistant on the engineering corps at Enola, Pa., and was furloughed for military service later that year. On returning to railway service, following his discharge from the Army Air Force in 1946, he was assigned to the Philadelphia Terminal division at Philadelphia. He was promoted to assistant supervisor of track at York, Pa., on the Maryland division during 1947 and the following year was transferred to Canton, Ohio, where he was located at the time of his recent promotion.

Howard L. Hood, whose appointment as track supervisor on the Illinois Central, with headquarters at Cherokee, Iowa, was noted in the October issue, was born on October 11, 1904, at Clare, Iowa. He entered the service of the I. C. on April 1, 1922, as a section laborer at Fort Dodge, Iowa, serving in this capacity until December, 1926, when he was advanced to assistant foreman. A year later Mr. Hood was further advanced to section foreman and served in this capacity at various locations until his recent promotion to track supervisor.

Edward H. Waring, whose appointment as roadmaster on the Denver & Rio Grande Western, with headquarters at Green River, Utah, was noted in the October issue, was born at Columbus, Ohio, on August 23, 1918, and was graduated from Ohio State university in 1940 with a degree in civil engineering. On June 11, 1940, he entered railroad service as a rodman on the New York Central at Columbus, and two years later he became a transitman at Toledo, Ohio. In July, 1944, he was granted a leave of absence to enter military service, returning to the N.Y.C. in July, 1946, as assistant engineer at Toledo. In November of the latter year he was appointed assistant supervisor of track at Bryan, Ohio. Mr. Waring went with the D.&R.G.W. in January, 1948, as assistant roadmaster at Ephraim, Utah, the position he was holding at the time of his recent promotion to roadmaster.

Bridge and Building

W. S. Ray, architect of the Central of Georgia, has been appointed assistant engineer bridges and buildings, with headquarters at Savannah, Ga.

E. D. Hedberg, bridge and building foreman on the Edmonton division of the Canadian National, has been promoted to bridge and building master on the Portage-Brandon division, with headquarters at Portage la Prairie, Man.

V. D. Raessler, general foreman of bridges and buildings on the Iowa division of the Illinois Central, with headquarters at Waterloo, Iowa, has been promoted to supervisor of bridges and buildings at Memphis, Tenn., succeeding **J. D. McBride,** who has retired.

C. L. Aurand has been appointed bridge and building supervisor on the Chicago & North Western, with headquarters at Boone, Iowa. **Orval Rhoades** and **William G. Ward** have been appointed assistant bridge and building supervisors at Fond du Lac, Wis., and Huron, S.D., respectively.

G. H. Dayett, Jr., formerly located at the Green Spring (Md.) timber treating plant of the Baltimore and Ohio, has been appointed district bridge inspector on the Eastern region, succeeding **W. O. Nelson,** whose promotion to assistant maintenance engineer is noted elsewhere in these columns.

A. Brandimarte, assistant master carpenter on the Philadelphia division of the Pennsylvania, has been promoted to master carpenter at New Castle, Pa., succeeding **G. H. Perry,** who has been transferred to Jersey City, N. J., to succeed **W. R. Taggart,** whose appointment as assistant engineer is noted elsewhere in these columns. **E. Watson,** junior engineer, succeeds Mr. Brandimarte as assistant master carpenter. **R. A. Westergren,** master carpenter at Sunbury, Pa., has been transferred to Terre Haute, Ind., replacing **N. I. Huntley,** whose appointment as assistant engineer is reported elsewhere in this issue. **R. F. Terrell,** acting assistant master carpenter on the Fort Wayne division, has been appointed assistant master carpenter on the New York division, succeeding **J. A. Campbell,** who, in turn, succeeds Mr. Westergren.

Edward B. Jones, recently promoted to supervisor of bridges and buildings on the Clifton Forge division of the Chesapeake & Ohio, with headquarters at Clifton Forge, Va., as noted in the August issue, was born at Seebert, W.Va., on January 8, 1907. He first entered railway service in June, 1926, as a track laborer during summer vacation. After graduating from high school in 1927, he worked for a time in the lumber industry and then returned to the C. & O. in February, 1929. He transferred to the carpenter forces in June of that year and subsequently served as carpenter and carpenter foreman. In January, 1942, he became a rodman in the engineering department and was promoted to bridge inspector on the Richmond division in March 1943. Mr. Jones became assistant supervisor of bridges and buildings of the Clifton Forge division on April 1, 1946, and was further advanced to assistant supervisor of bridge erection of the system on May 16, 1947, with headquarters again at Richmond, the position he held until his recent promotion.

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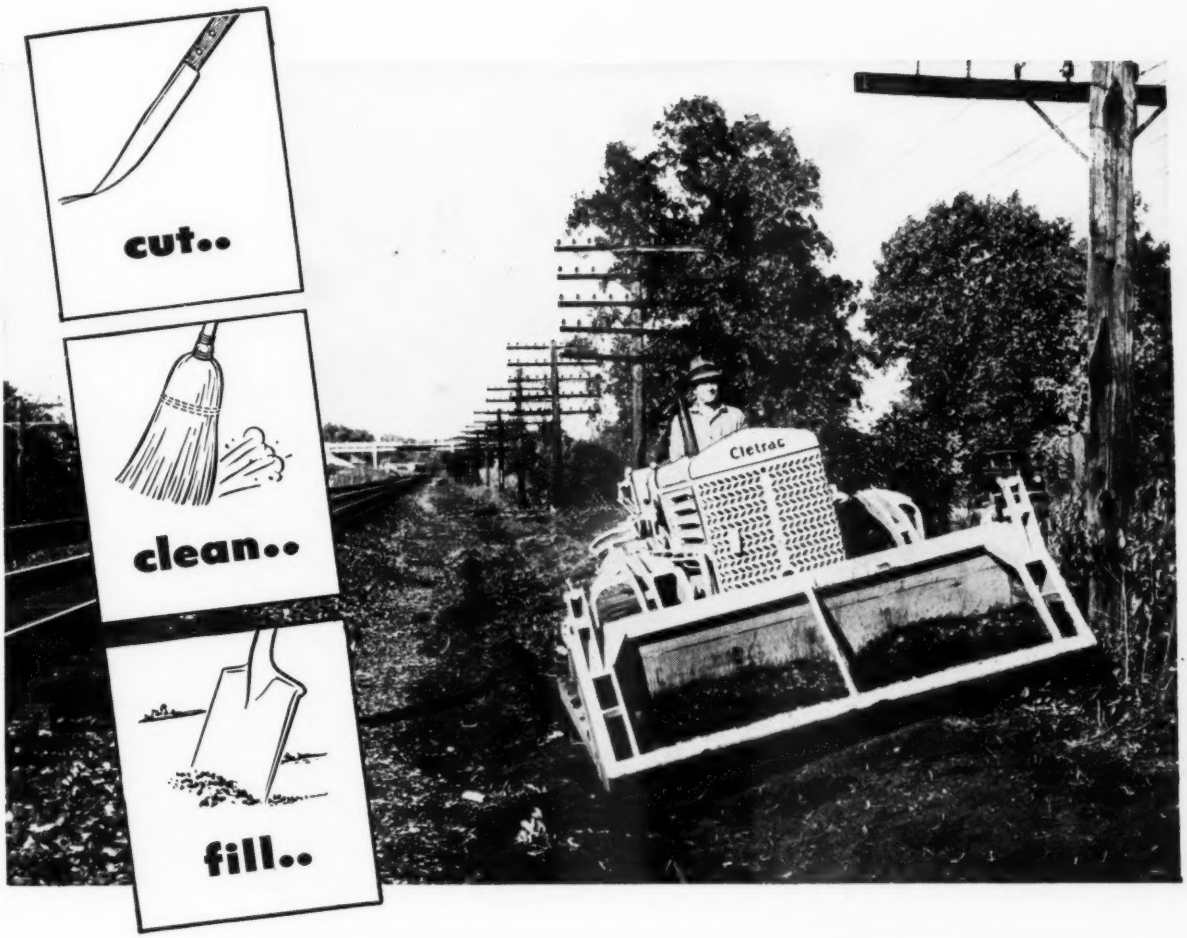
ADDITIONAL INFORMATION

On Any of the Products Mentioned in This Issue

Below is a complete index of the products referred to in both the editorial and advertising pages of this issue. If you desire additional information on any of them, use one of the accompanying addressed and stamped postcards in requesting it. In each case give name of product and page number. The information will come to you directly from the manufacturer involved, without any obligation on your part.

Products Index



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Cutting and cleaning ditches . . . filling in low spots, one man can do the whole job with an Oliver "Cletrac" tractor and Drott Bull Clam.

This efficient unit cuts and removes grass and weeds, cuts ditches, levels and grades right-of-way, and carries surplus dirt wherever it's needed. It performs all the work of a scraper, shovel, grader and bulldozer . . . at far lower cost. Bowl is opened to make a cut . . . closed to carry the dirt without spillage. The bowl can be closed and down pressure applied to do fine-grading.

The exclusive Oliver "Cletrac" steering principle with power on both tracks at all times, permits the unit to work in closer quarters . . . to operate with greater safety on slopes and hills. It also allows the tractor to handle heavy front-end loads without excessive wear on tractor frames and steering mechanisms.

For all the facts on the "one-man crew" and the other versatile auxiliary equipment that makes Oliver "Cletrac" the most efficient off-track maintenance unit, see your Oliver "Cletrac" dealer or write The OLIVER Corporation, 19300 Euclid Avenue, Cleveland 17, Ohio.

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The OLIVER Corporation

"THE SIGN OF EXTRA SERVICE"

OLIVER Cletrac SALES SERVICE

Railway Personnel (Cont'd)

Rush A. Kelso, formerly track supervisor on the Southern, at Sheffield, Ala., has been promoted to bridge and building supervisor at Valdosta, Ga.

Special

C. G. Haughton, supervisor of land titles and surveys of the Canadian National, with headquarters at Montreal, Que., has retired.

J. E. Tiedt, engineer of water service, Chicago, Rock Island & Pacific at Chicago, has also been appointed work equipment supervisor.

G. C. Gilkison has been appointed supervisor of material of the Erie, with headquarters at Cleveland, O., succeeding **W. J. Donlevy,** who retired on September 30, after 44 years of service.

David L. Smith, assistant engineer of the Atlantic Coast Line, has been appointed assistant real estate agent at Wilmington, N.C., and **John A. Gresham,** senior assistant engineer at Wilmington, has been appointed assistant real estate engineer.

E. H. Byer, assistant to the superintendent of fire prevention of the Chesapeake & Ohio, has been promoted to superintendent of fire prevention, with headquarters at Richmond, Va., succeeding **W. A. Radspinner,** who retired on November 1.

L. G. Mosher, personnel assistant in the maintenance of way department of the New York, Chicago & St. Louis, has been named assistant to the director of personnel, with headquarters as before at Cleveland, Ohio.

Obituary

W. R. Ganser, division engineer of the Chicago Terminal division of the Pennsylvania, with headquarters at Chicago, died in that city on November 9, following a heart attack. He was 55 years old.

H. R. Geib, assistant to the chief engineer maintenance of way of the New York Zone of the Pennsylvania, with headquarters at New York, died on November 4, at the Elizabeth General Hospital, Elizabeth, N.J., following a brief illness.

Clark Dillenbeck, retired chief engineer of the Reading, whose death at Plainfield, N.J., on October 9, was announced in the November issue, was born at Paletine, N.Y., on June 24, 1866, and graduated from Cornell University in 1888. The following year he became associated with the John G. Ferris Steel Company in Pittsburgh, Pa., and in 1890 he entered the service of the Philadelphia & Reading (now the Reading) as assistant to the engineer of bridges. Subsequently, he served as assistant engineer and as engineer bridges and buildings until 1918, when he became assistant chief engineer. He was advanced to chief engineer in 1927.

Association News

Bridge and Building Association

President E. H. Barnhart has called a meeting of the Executive committee to be held at Chicago on December 6. The principal purpose of this meeting will be to select the personnel of the technical committees. As usual these appointments will be made largely on the basis of preferences indicated by members on cards sent to them some time ago. The Executive committee will also hear reports on the association's finances and the acquisition of new members.

Metropolitan Maintenance of Way Club

The opening meeting of the 1948-49 season was held at the Hotel Sheraton, New York, on October 28 with 108 members and guests attending. Robert L. Groover, chief engineer, Atlantic Coast Line, Wilmington, N.C., was the principal speaker. In his talk, which was entitled "Maintenance of Way Problems," Mr. Groover laid stress on the present shortages in labor and materials, pointing out that the present situation in world affairs calls for increased conservation of available materials and continued search for effective substitute materials.

The next meeting of the club will be held on December 9. As in the past this is to be a luncheon meeting, preceding the annual dinner on the same day of the New York Railroad Club.

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Meetings and Conventions

American Railway Bridge and Building Association—Annual meeting, September 13-15, 1949, Hotel Stevens, Chicago. Elise LaChance, Secretary, 431 S. Dearborn street, Chicago 5.

American Railway Engineering Association—Annual Meeting, March 15-17, 1949, Chicago. W. S. Lacher, secretary, 59 E. Van Buren street, Chicago 5.

American Wood-Preservers' Association—Annual Convention April 26-28, 1949, St. Louis, Mo. H. L. Dawson, secretary-treasurer, 1429 Eye street, N.W., Washington 5, D.C.

Bridge and Building Supply Men's Association—E. C. Gunther, secretary, 122 S. Michigan avenue, Chicago 3.

Maintenance of Way Club of Chicago—Next meeting, December 13, 1948. E. C. Patterson, secretary-treasurer, Room 1512, 400 W. Madison St., Chicago 6.

Metropolitan Maintenance of Way Club—John S. Vreeland, secretary, 30 Church street, New York.

National Railway Appliance Association—Annual exhibit, Chicago, March 14-17, 1949, in connection with the A.R.E.A. convention. R. B. Fisher, secretary, 1 No. LaSalle street, Chicago 4.

Railway Tie Association—Annual convention, September 12-14, 1949, Peabody Hotel, Memphis, Tenn. Roy M. Edmonds, secretary-treasurer, 610 Shell Building, St. Louis 3, Mo.

Roadmasters' and Maintenance of Way Association of America—Annual meeting, September 13-15, 1949, Hotel Stevens, Chicago. Elise LaChance, secretary, 431 S. Dearborn street, Chicago 5.

Track Supply Association—Lewis Thomas, secretary, 59 E. Van Buren street, Chicago 5.

Association News (Cont'd)

Roadmasters' Association

On November 8 the Executive committee held a meeting at Chicago at which the principal item of business was the selection of personnel for the technical committees that are to prepare reports for presentation at the 1949 convention. As of the date of the meeting the secretary reported that the association had 1035 members of all grades, including 64 active members and 6 associate members who had joined since the 1948 convention. The finances of the association were also reported to be in excellent condition.

Maintenance of Way Club of Chicago

With 169 persons in attendance the last meeting was held at Eitel's restaurant in the Field building on November 22. The principal speaker was C. J. Code, engineer of tests, maintenance of way, Pennsylvania, whose subject was Field and Laboratory Tests of Maintenance of Way Materials.

The next meeting will be held on December 13 at the same location. At that meeting J. P. Datesman, engineer of track, Chicago & North Western, will speak on The Maintenance of High Speed Track.

American Railway Engineering Association

It is expected that the pamphlet giving personnel and assignments of committees will be mailed to members this year about December 15, fully three and one-half months earlier than has been the practice. The purpose is to make it possible for committees to get started on the year's work at an earlier date. This pamphlet will show that more than 900 members of the association are serving on 1,000 places on 21 committees, and that several committees are up to the maximum of 60 members as established by the Board of Direction. These figures represent a large increase in the number of members serving on committees, an increase that has been due to the large influx of new members during the past year. The last pamphlet showing committee personnel and assignments, dated April, 1948, showed that 733 men were occupying 875 places on the same 21 committees.

Railway Supply Groups Limit Exhibits to Alternate Years

As a result of correlated, yet independent, action on the part of the governing bodies of the National Railway Appliances Association, the Track Supply Association and the Bridge and Building Supply Men's Association, these three groups have adopted similar resolutions calling for the holding of exhibits in alternate years—the N.R.A.A. in March, and the Track Supply and Bridge and Building Supply Men's Associations, jointly, in September. As a result of these actions, the Track Supply and Bridge and Building Supply Men's Associations will not exhibit in September, 1949, in conjunction with the concurrent annual meetings of the Roadmasters' and Bridge and Building Associations, and the N.R.A.A. will not exhibit in March, 1950, in conjunction with the annual meeting of the American Railway Engineering Association. The N.R.A.A. will, as previously planned and announced, present an exhibit in March, 1949, at the Coliseum, Chicago, during the Golden Anniversary Convention of the A.R.E.A. By appropriate resolutions, the Track Supply Association and The Bridge and Building Supply Men's Association have accepted an invitation extended to them by the N.R.A.A. to display their banners and membership lists at the March, 1949, exhibit, in joint recognition by the industry of the important occasion being celebrated by the American Railway Engineering Association.

Supply Trade News

General

The **Stonhard Company** has announced its removal to new quarters at 1306 Spring Garden street, Philadelphia 23, Pa.

The Los Angeles, Calif., office and warehouse of the **Dixie Cup Company** has been moved to larger quarters at 2600 East Twelfth street, Los Angeles 23.

The **Reynolds Metals Company,** Louisville, Ky., has announced the appointments of the **American Brass & Copper Co.,** Oakland, Cal., and the **Western Metals & Supply Co.,** San Diego, Cal., as distributors of Reynolds aluminum products.

The Western Railroad Supply Company, has acquired the business of the **Pneumatic Gate Works,** formerly of 3335 South Ridgeway avenue, Chicago, and has moved the tools and equipment to its plant at 2428 South Ashland avenue, Chicago 8, where the production of Elliott pneumatic gates, compressors and replacement parts therefor will be consolidated with the manufacturing operations of the Western Railroad Supply Company.

Personal

William Kusz, special representative of the **Caterpillar Tractor Company,** Peoria, Ill., has been appointed supervisor of industrial advertising, succeeding **K. M. Emery,** who has been advanced to supervisor of cooperative dealer advertising.

L. W. Mendenhall, assistant advertising manager of the **National Aluminate Corporation** at Chicago, has been advanced to advertising manager at that point. Mr. Mendenhall was born on May 15, 1921, at Pittsburgh, Pa., and received a B.A. degree in journalism and advertising at the University of Wisconsin in 1943. He served in the navy as lieutenant (j.g.) during World War II, and joined National Aluminate on January 28, 1946, as assistant advertising manager.

Harold E. Donovan, whose appointment as vice-president of the **T. W. Snow Construction Company,** Chicago, was noted in the September issue, was born at Wausau, Wis., on August 7, 1914, and was graduated from Marquette university in 1937, with a Bachelor of Science degree in

Harold E. Donovan

civil engineering. In October, 1937, he went with the Chicago, Milwaukee, St. Paul & Pacific as assistant water inspector, with headquarters at Chicago. Mr. Donovan subsequently served as water inspector and assistant engineer until October 1, 1947, when he joined the T. W. Snow Construction Company, with headquarters at Chicago.

G. C. Wilhide, Jr., has been appointed service engineer for the **Black & Decker Manufacturing Company,** with headquarters at Atlanta, Ga., to succeed **R. A. Wernsdorfer,** who has been transferred to Baltimore, Md.

John F. Hall, field engineer in New York for the **Portland Cement Association,** has been appointed district engineer in charge of the New York office, succeeding **E. M. Fleming,** who has retired following 22 years as a member of the association's staff.

William J. McGraw, manager of electric tool sales in the New York territory of the **Independent Pneumatic Tool Company,** has been appointed manager of the Cleveland (Ohio) branch. Mr. McGraw will be succeeded by **E. B. Rosell,** electric tool service engineer at Chicago.

The **Pennsylvania Refining Company,** Cleveland, Ohio, has announced the appointment of **Frank D. Messenger** as manufacturer's representative for its complete heavy-duty line of Penn Drake motor oils, greases, gear lubricants and specialty products, with headquarters at Fair Haven, Mich.

Obituary

Frank E. McAllister, who retired in July, 1942, as president and general manager of Kalamazoo Manufacturing Company, Kalamazoo, Mich., and who relinquished the post of board chairman later in that year, died aboard a train as it was leaving Chicago on October 30.

Trade Publications

(To obtain copies of any of the publications mentioned in this column, use postcards, page 1305.)

Load Ties Fast at Lower Cost—This is the title of a four-page two-color bulletin issued by B. L. Montague Company, Inc., describing and illustrating this company's Montague crosstie loader.

Bucket Loader Performance—Pettibone Mulliken Corporation has issued a 12-page circular on the Haiss heavy-duty bucket loaders equipped with integral swivel belt conveyors. In addition to giving the principal specifications of the various models, the circular describes and illustrates, with large pictures, various applications of the machines in materials handling.

Electric Power for Every Purpose—This is the title of a 12-page, two-color catalog recently published by the Homelite Corporation to describe its complete line of carryable gasoline-engine-driven generators. Structural details are described and illustrated in the bulletin, which also contains a number of pictures of typical uses for Homelite generators.

Link-Belt Speeder Corporation—This company has issued a 16-page booklet representing a complete photographic trip through its modern shovel-crane plant at Cedar Rapids, Iowa. The booklet contains action photographs, with descriptive captions, of all the various offices and shops of the plant and concludes with views of the finished products.

Railroad Snow Loader—The Barber-Greene Company has released a four-page folder dealing with its Model 568 railroad snow loader-melter. The pamphlet, which is printed in two colors, describes the operation of the snow removal plant, and also contains pictures of the equipment. In addition, the company has issued a two-page specification sheet containing dimensions and clearance drawings, and giving complete information on the details of the equipment.

Onan Electric Plants—An illustrated, 20-page, two-color catalog covering the complete line of Onan electric plants has been issued by D. W. Onan & Sons. It contains, in addition to illustrations, descriptions and specifications of the various models, a model guide to assist in the proper selection of power plants, a general information section giving statistics on watts required to operate various electric appliances and motors, and a section devoted to special accessories.

Industrial Protective Coatings—A 12-page, two-color bulletin has been issued by Koppers Company, Inc., to call attention to its industrial protective coatings for preventing corrosion and deterioration. The various types of protective coatings for cold application are described in detail, together with information on coverage, primers needed, drying time, thinners, and temperature limits. The folder also presents pictures of specific applications, and outlines methods of preventing corrosion caused by industrial atmospheres, chemical fumes, etc.

BUSY BUCKETS

For the railroads Blaw-Knox builds buckets that are kept busy on many jobs . . . fueling engines, rehandling from stock piles, ash pit service, ballast rehandling, barge clean-up, etc. For a quick appraisal of Blaw-Knox Buckets widely used for railroad work, write for Bulletin 1989.

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BLAW-KNOX BUCKETS

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- ★ *Off-The-Track*
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You can reduce wear and tear on rolling stock, reduce road bed maintenance and increase rail life with this powerful, light weight off-the-track 6 H.P. Mall Rail Grinder. The variable speed gasoline engine provides abundant power for smoothing off rail joint welds, grinding frogs, switch points and crossings.

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Complete Catalog Upon Request

Railroad Department

MALL TOOL COMPANY

7746 South Chicago Ave. **Chicago 19, Illinois**

MALL REPRESENTATIVES: Allied Tools & Supply Co., Louisville; John N. Thorp Co., New York; Hubbell & Co., St. Louis; D. N. Carlin Co., Pittsburgh; R. W. Hudgins & Son, Norfolk.

Mall REG. U.S. PAT. OFF. PORTABLE POWER TOOLS

Barber-Greene

Cuts unloading time as much as 90%

Cuts costs in HALF!

A hopper-car unloaded to trucks or to stock pile by one man . . . in forty-five minutes! This is the proved day-to-day performance of the new B-G 358 Hopper-Car Unloader and 363 Conveyor.

Model 358 All-Purpose Unloader

MODEL 358 ALL-PURPOSE UNLOADER handles any material. Working over rails or in pits, it unloads a carload in as little as 45 minutes, with no jamming, no delays. Positive non-slip drive, sturdy antifriction bearings, Alemite fittings . . . assure years of dependable service. A perfectly balanced machine, it moves easily by hand, trails at road speeds.

Model 363 Portable Conveyor

MODEL 363 PORTABLE CONVEYOR establishes a new standard of lightweight portability combined with strength and efficiency. Pneumatic-tired wheels swivel for radial stock-piling; self-cleaning hopper end with removable cover and hopper plates assures longer belt life; antifriction bearings and belt idlers provide smooth operation. 24" belt; lengths, 25', 30', and 35'.

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104A

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For further information about Layne Well Water Systems or Vertical Turbine Pumps, request catalogs, bulletins, etc. No obligation. LAYNE & BOWLER, INC., General Offices, MEMPHIS 8, TENN.

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ALPHABETICAL INDEX TO ADVERTISERS, DECEMBER, 1948

Rear end of cleaning unit, showing disposal conveyor above, ejecting waste to the side, and delivery conveyor below distributing cleaned ballast.

Ballast Cleaner includes two units: a towing and digging unit shown at the right, and a Diesel-powered cleaning unit behind. An endless scraper chain passing beneath the track excavates the ballast, which is elevated first by the digging chain itself and then by a belt conveyor to vibrating screens, where it is freed of waste and conveyed to a chute for redistribution beneath the ties.

2 *new machines*

The Matisa Automatic Ballast Cleaner and the Matisa Automatic Tie Tamper, both developed in Switzerland and experienced in track maintenance service in England, France, and Belgium in the past 12 years, are now available to American railroads.

Both are self-propelled on-track machines. Output for the Ballast Cleaner is 150 to 240 lineal feet of track per hour of actual uninterrupted operation, depending on ballast conditions. The Tie Tamper, requiring only one man to operate, will tamp 400 to 600 feet of track per hour under normal conditions.

Full details and work records on request.

Scraper chain will dig ballast to any depth up to 36 inches below bottom of ties.

Also Universal Bolt and Tie Screw Driving Machines, Rail Drilling Machines, Tie Drilling Machines, Pulsators, Motor Rail Trucks

The MATISA EQUIPMENT CORPORATION
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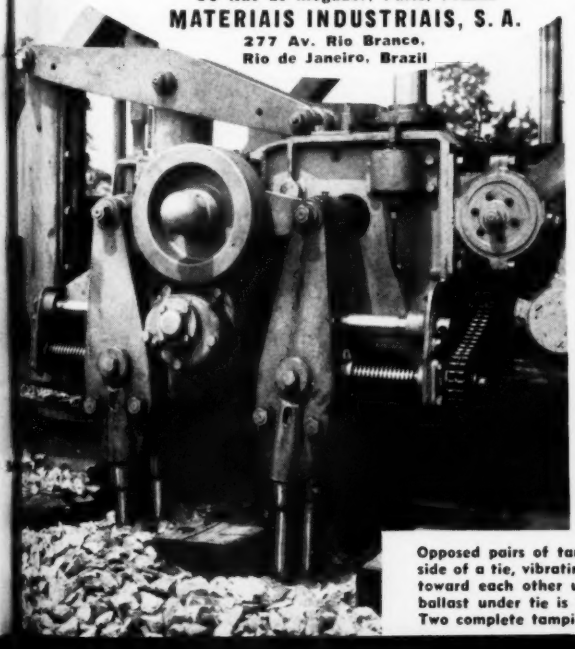

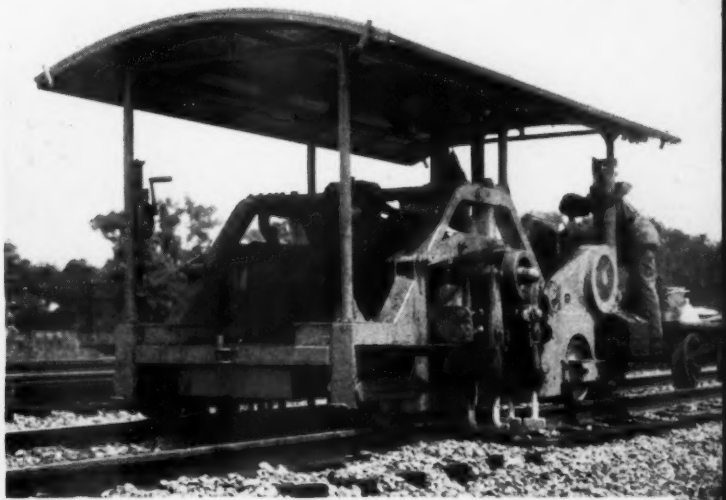

Opposed pairs of tamping tools work from each side of a tie, vibrating rapidly while being forced toward each other until desired compactness of ballast under tie is attained.
Two complete tamping mechanisms (one on each side), each comprising 8 tamping tools working in pairs, 4 inside and 4 outside of rail, are raised and lowered by means of compressed air. They are mounted on the Tie Tamper, which is powered and propelled by a combustion engine

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